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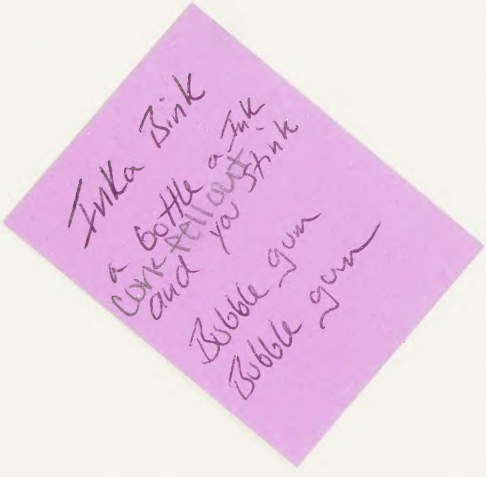
Inka Dink
a bottle a Ink
and a Pen
Bubble gum
Bubble gum

The Eclectic Materia Medica, Pharmacology and Therapeutics

By

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Preface.

This text-book upon drugs and their uses is the response to the repeated requests of students and graduates of the Eclectic Medical College of Cincinnati, who for some years have attended the author's lectures upon materia medica and therapeutics. These requests he has accepted as the expression of an evident need of such a book.

In acceding to this demand it has been the purpose of the author to present the accepted facts of Eclectic therapeutics in as condensed a form as possible without the sacrifice of clarity, and in as plain and every-day language as might be consistent with the purpose. Notwithstanding this, it has been necessary, at the risk of appearing pedantic, to use a large preponderance of scientific terminology. Our only excuse for this is that the student at least once during his study of the subject should familiarize himself with the technical language of the science.

Many apochryphal statements, it seems to the author, have in the last few years crept into the literature of our therapeutics. By close pruning, he has endeavored in this work to eliminate some of these, realizing, however, that he has succeeded but partially. Over-praise of drugs, like adulation of individuals, is often equivalent to their damnation. He has, therefore, not hesitated to criticize boldly statements of writers where he has believed them to be at variance with the accepted truths of common experience, or with his own conception of them. This he has done in no unfriendly spirit of antagonism, but rather in the charitable belief that unrestrained enthusiasm rather than sound therapeutic judgment is responsible for many misstatements and exaggerations concerning the virtues of drugs, and that such a course of deletion is essential if our drug literature is to be purged of exaggerated and unsustained statements.

Lest he himself be unwary the author has endeavored to avoid the too common pitfall of over-enthusiastic claims concerning the virtues of drugs and therapeutic measures. He has, moreover, set up his own judgment in the selection and collating of facts which seem to him well authenticated and best substantiated, as well as in recording that which is of personal knowledge to him and which his professional experience supports. He does not expect every one to agree with him and he welcomes constructive criticism. If, in the consideration of a drug, he has not done full justice to it, as others see it, it is because he believes that drug to have been overestimated, and consequently overlauded, and that a conservative estimate must alone be recorded. If a drug apparently of slight value to others seems to

have received fulsome praise, it is because the personal experience of the author with that drug justifies such consideration. The latter is notably true of some of the minor drugs (*e. g.*, matricaria) from which non-shocking effects alone are obtained, and which from their seeming unimportance have not been used much by many physicians. Again, many drugs not frequently employed have been given space because they sometimes serve purposes which no other drugs can fulfill. *Conservatism* and fidelity to the experiences of the many, rather than a record of the merely new, novel, or bizarre. and generalizations rather than the single experiences in drug therapy have been kept uppermost in the plan of the book; and wherever possible the specific use of specific means, according to established specific indications, has been given preference to other forms of medication.

Throughout this work the author has attempted that which he believes to be largely an innovation in Eclectic therapy—the consideration of the relative value of drug uses by *contrast*, noting the failures of medicines as well as their successes. This he believes to be the most meritorious of his efforts, and of the greatest value to the student who may use this book as a therapeutic guide.

Though the pharmacological or so-called physiological action of drugs is neither followed nor relied upon in Eclectic therapy for the purpose of prescribing drugs (except in a few instances noted in the text), a condensed statement of the pharmacology of each drug, with few exceptions, has been included. This we believe to be of importance in order that the student may have access to a summary of the accepted views of pharmacologists, and that he may know the tissues acted upon and the kind and extent of action when a drug is administered in certain or in varying amounts. As such pharmacological studies are not the results of experimental or other studies by Eclectic physicians, the author has drawn freely, for this part of the book, upon the excellent treatises of such old-school authors as Cushny, Hare, Wilcox, Butler, Bastedo, Stevens, Sollmann, Potter, and others. To these authors credit is herein cheerfully extended for such material as has been abstracted or subjected to digest. Besides these sources, a large part of the pharmacology has been derived from the author's previous work—the revised *American Dispensatory*. From the latter, as well as from Taylor's *Medical Jurisprudence*, and from special contributions by the author to Journals, have been derived most of the facts of Toxicology. These two phases—the latter quite fully—have been stressed because no other Eclectic materia medica has given them space and because both students and practitioners alike need and demand such information.

It is a matter of regret that in some otherwise excellent works on Eclectic therapeutics there appears an almost hopeless and well-nigh inextricable entanglement of the subjects of pharmacologic and toxicologic

action with those of symptomatology and therapeutic action. This confusion the author has attempted to rectify by keeping distinctly separate the subdivisions of action (pharmacologic and near-toxic), toxicology, and thearpeutic action. Under therapy he has also made two divisions of uses—External and Internal—thus facilitating quick access or reference to means of treatment.

Every page of this work reflects Specific Medication as far as the limits of the latter will permit, the specific uses of drugs according to established indications having been accorded the greatest prominence. Other approved therapy has been fully included, many of the sound and older remnants of a past practice of therapeutics not having as yet been replaced by specific medication methods. To satisfy the demands of those who desire to study and prescribe according to therapeutic classes of drugs (as cathartics, diuretics, etc.), a Classification of Drugs has been devised which comprises physiologic, pharmacologic, biologic, and therapeutic features. A careful study of this, we believe, will be a valuable aid to the student, and will in no way interfere with the study of the specific medication method of applying drugs. As yet no satisfactory or complete classification of specific medication has been made, but an outline of a method toward such a classification follows the preceding.

Under each drug the *Specific Medicines* have been made the *preparations of preference*, whenever such representatives are available. The sole reasons for this preference, aside from their preeminent excellence, are the facts that the practice of Modern Eclecticism is chiefly that of Specific Medication and that the latter has been built up upon specific indications established through the use of the Eclectic Specific Medicines. Where it is desired to use other preparations a list of other classes of medicines has been included—a list embracing the tincture and fluid extracts, etc., with doses of the chief drugs not otherwise mentioned in the text.

The few illustrations that have been introduced do not in all instances represent the leading Eclectic medicines, but rather those of plant drugs that are typical of certain features, historic or medicinal, and most of which, in one way or another, have in some measure contributed from the earliest days of American aboriginal, domestic, and botanic medicine to the evolution and progress and final development of Eclectic therapeutics. Some merely represent drug landmarks that have been passed by in the therapeutic march to the present. The author regrets that lack of space precludes the inclusion in this work of historic notes—a purpose originally intended.

Finally, the author hereby extends his grateful thanks to all not otherwise mentioned, for borrowed material, or who in any way have contributed toward the production of the book. For the use of illustrations and tables credit has been acknowledged at their place of insertion. To men-

tion the Eclectic sources of data would be to quote the whole range of Eclectic literature. Usually, however, where an important quotation has been used or material facts recorded from the works of Eclectic authors credit has been given in the article. The author has drawn largely upon his own contributions to *The Eclectic Medical Journal*, to *The Eclectic Medical Gleaner*, to Locke's *Syllabus of Eclectic Materia Medica*, and to his revision of King's *American Dispensatory*. In some instances considerable material has been taken *verbatim et literatim* from the latter work. For all these sources we extend our thanks to the publishers.

HARVEY WICKES FELTER

1728 Chase Ave., Cincinnati, Ohio, June 10, 1922.

NOTE.—Since this work has been "set up" in type, an article by J. F. Rock, Agricultural Explorer for the United States Bureau of Plant Industry, establishes the source of true Chaulmoogra Oil as the fruit of the Kalaw Tree—the *Taraktogenos Kurzii*, King, found in northern Burma and in Assam. For more than a century the source has been credited to a tree of the same family—the *Gynocardia odorata*. (See page 400.) Closely similar trees—the *Hydnocarpus anthelmintica* (of Siam) and *Hydnocarpus castanea* (of Burma)—yield an oil very similar to that of Chaulmoogra. True chaulmoogra oil and its acid constituents—*chaulmoogric* and *hydnocarpic acids*, and especially their esters (isolated some years ago by Dr. Frederick B. Power and assistants) have recently been used intramuscularly with reputed remarkably curative effects in leprosy. Chaulmoogra seeds have been planted in this country to furnish a future source of the oil. See interesting illustrated article by Rock in *The National Geographic Magazine*, Vol. XLI, No. 3, March, 1922, detailing the journey and quest of the explorer for the true chaulmoogra tree.—(H. W. F.)

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PART I.

Introduction.

I. DEFINITIONS AND GENERAL CONSIDERATIONS.

A Medicine is a drug or remedial substance given or applied in the treatment of, or for the prevention of disease.

A Drug, strictly speaking, is a dried medicinal plant, or any crude medicinal substance. The term is now used interchangeably with that of *A Medicine*.

Materia Medica (materials of medicine) are the medicinal substances used in the treatment of disease. The term *Materia Medica* is usually applied to a treatise on the materials used as medicines—comprising their history, source, physical characters, constituents, chemical properties, preparations, doses, and administration. Generally such a work also includes more or less of *Pharmacodynamics*, or the consideration of drug power, and of *Toxicology*, or the consideration of poisons.

Pharmacodynamics is a study of the power of drugs upon the normal living organism, and the term is the equivalent of that of the "Physiological Action of Drugs".

Toxicology is a study of poisons and the poisonous effects of drugs. It includes their description, detection, symptoms, antidotes, antagonists, and treatment.

Pharmacology, strictly, is a discussion of the changes produced by unorganized substances in minute attenuation, aside from foods, in living organized tissues. It is practically identical with physiological action, but of greater scope, and with pharmacodynamics. Some, chiefly in the past, use the term more broadly to cover those branches of medical science included in Materia Medica and Therapeutics; *i. e.*, a consideration of drugs and medicines in all their relations.

Physiological Action is chiefly the action of drugs upon *healthy* animals, and has been studied to a lesser extent upon man. Pharmacological Action is determined upon both *healthy* and *diseased* tissues in animals and man. Drugs sometimes fail to make any impression in health but act readily in disease. Effects upon the higher types of organisms usually coincide in the same types, but conditions, food, and chemical forces tend to cause variations and modifications, so that experimental conclusions and deductions are not always absolutely dependable. Again there is great variance in the action of drugs upon animals and upon man, and that in some animals is widely divergent from that upon other mammals. In the main, however, there is quite general agreement. The chief value of animal experimentation is to point out the direction and extent of

activity which a drug has upon certain types of tissue. The ultimate object, however, is to find a sufficient and sound reason for its application in the administration of medicines for the relief or cure of disease. This has been but partially attained, and a vast field awaits the future explorer. The fullness of realization, perhaps, will not come until the effects of drugs upon man, and not so much those upon animals, will have become more accurately determined by the use of drugs of standard quality, given in varied doses, both in a state of health and in that of disease. Much of the physiological action of drugs upon man has been acquired from overdosing and cases of poisoning, and to lesser extent from drug-proving.

Therapeutics is the art of applying drugs and other agents and measures for the alleviation or for the cure of disease. Therapeutics is (1) Empirical, (2) Rational, and (3) Specific.

Empirical Therapeutics is that for which no other reason can be given than that it has been hitherto repeatedly used with success. When a medicine or measure is employed to accomplish that which it has been known to do in previous like conditions, in like doses, and under like circumstances, it is said to be an *Empiric Remedy*. Empirical Therapeutics has been aptly named the "Therapeutics of Experience". It does not take into consideration physiologic or pathologic reasons, but is based solely upon observations in past experiences of the effects of drugs and of other remedial measures. It is a valuable form of therapeutics, but should constitute only a part of its practice; and will gradually be supplanted by the rational form as fast as scientific knowledge attains that stage which reveals exactly how a medicine acts in disease.

Rational Therapeutics is that in which the method of action of a remedy can be accounted for. It is based upon the use of medicines according to their known physiologic, chemical or biologic action upon definitely known pathological conditions or perverted functions. While Empirical and Rational Therapeutics are diametrically opposite, both are, in the present state of our knowledge, necessary in the treatment of the sick until a more perfect knowledge of the action of medicines upon the body, in both health and disease, shall have been established. Many of our best drugs are employed empirically, no other guide than the record of experience of repeated successes being available. On the other hand, the use of drugs through Rational Therapeutics will prevail as instruments of precision when a scientifically known and predetermined positive effect can be verified by actual clinical application.

Specific Medication (Specific Therapy) is that in which known specific remedies, repeatedly proved to be such, are employed to correct conditions evidenced by known specific indications for such remedies. Though the result of a process of gradual evolution in early Eclectic medicine, the theory was formulated, established, and put into practice in 1869 by Dr. John Milton Scudder of Cincinnati, Ohio. It is based upon the theory *that there is a fixed relationship between drug-force and disease-expression*. (For further consideration, see article on *Specific Medication*, p. 54.)

Other Forms of Therapeutics.—Therapeutics is also spoken of as Natural Therapeutics, the operation of Nature's healing power; and

Applied Therapeutics, the practical and customary application of known means and drugs in the treatment of disease. The following specialized terms are also recognized:

Drug Therapy is the application of drugs or medicines in the treatment of disease.

Electrotherapy is the application of electricity in the treatment of disease.

Hydrotherapy is the application of water in the treatment of disease.

Psychotherapy (Mental Therapeutics or Mind Cure) is the use of the power of the mind over that of the sick individual.

Radiotherapy is the application of the various light-rays in the treatment of the sick. More recently it has been largely restricted to the use of Radium in disease.

Sero-Therapy (Serum-Therapy) and *Vaccino-Therapy* (Vaccine-Therapy) refer to the use of serums and bacterial vaccines in the prevention and treatment of disease.

Organotherapy (Cellular Therapy) is the use of animal organs or their extracts in the treatment of disease.

Dynamic Therapeutics is "treatment based on the careful selection of each separate drug for distributive purpose" (Dorland).

Mediate Therapeutics. The administration of a medicine to a nursing mother in order to affect the child.

Suggestive Therapeutics. The use of hypnotic suggestion in the treatment of disease.

Pharmacognosy treats of the identification and chemical composition of crude drugs. It takes the place of much that once constituted pure materia medica, but includes not only macroscopic but microscopic identification.

Pharmacy is the art of preparing, compounding, and dispensing drugs and medicines for therapeutic uses.

Posology is the study of dosage and its relation to different ages, sizes, weights, sex, idiosyncrasy, tolerance, time of administration, and conditions of disease in individuals.

II. THE PARTS, CONSTITUENTS AND DERIVATIVES OF PLANT DRUGS.

[This section is arranged so that it may serve as a *Brief Laboratory Manual of Organic Materia Medica.*]

(*a*) *PARTS OF PLANTS EMPLOYED AS MEDICINES OR IN THEIR PREPARATION.*

The parts of plants (plant organs and accessory parts or derivatives) used in medicine are: Roots, rhizomes, tubers, bulbs, and corms; woods and twigs and barks; herbs, leaves, whole flowers, styles and stigmas; fruits and seeds; hairs, pith, spores, glands, excrescences, exudates, inspissated juices, and fecula.

ROOTS (*Radices*).

The *Root* (radix) is the descending or underground (usually) portion of the plant axis or stem, and has neither leaves nor modifications of leaves. It varies in size, shape and color in different plants, and is usually irregularly divided or branched. The function of the root is to hold the plant in a fixed position and to absorb plant food (moisture and salts) for elaboration in the leaf. So-called tuberous roots (see *Tubers* and to some extent some other roots) also serve as storehouses of reserve food material (starch, etc.). Roots are destitute of, or nearly free from chlorophyll.

Macroscopic Examination.—
Note: (1) size and shape;
(2) color, both external and internal;
(3) nature of fracture (abrupt or brittle, fibrous or elastic, etc.);
(4) odor;
(5) taste (insipid, sweet, bitter, acrid, etc.).

Examples for Study. Apocynum, belladonna, ipecac, echinacea, phytolacca, gelsemium, asclepias, bryonia, althæa, lappa, baptisia.

The student should make a detailed examination of the root or roots assigned him and record his findings upon a blank provided for the purpose. A drawing of the drug should also be made by the student.

RHIZOMES (*Rhizomata*).

The *Rhizome* (rhizoma), or rootstock, is a modified stem creeping partly or wholly underground, commonly thickened by containing reserve food material, and has rootlets or radicles attached chiefly on the under side. Rhizomes are marked by well-defined cup-shaped scars indicating the site of the stem of the previous year's growth, and by sheathing leaf-bases. The older extremity of the rhizome is frequently decayed. Rhizomes grow mostly in a horizontal or oblique position; sometimes perpendicular, in which case they may be wholly surrounded by rootlets.

Macroscopic Examination.
Note: (1) size and shape;
(2) color, within and without;
(3) nature of fracture (short or fibrous, etc.);
(4) position and character of stem-scars;
(5) whether rootlets are large or small, sparse or abundant, wiry or brittle; and whether they are grouped near nodes or more widely distributed;
(6) odor;
(7) taste.

Examples for Study.—Podophyllum, sanguinaria, geranium, hydrastis, valerian, cimicifuga, cypripedium, convallaria, collinsonia, iris, serpentaria, triticum.

TUBERS (*Tubera*).

The *Tuber* (tuber) is a subterranean stem or thickened portion of a rootstock, marked with buds or eyes. (There are all gradations between a tuber and a rootstock.) It has no leaves nor scales. Sometimes the term *tuberous root* is used for tuber and is so accepted in pharmacognosy. The tuber is a storehouse of plant food, many being particularly rich in starch.

Macroscopic Examination.—
Note: (1) size, shape (napiform, conical, pyriform, globular) and surface;
(2) color, within and without;
(3) appearance upon fracture;
(4) odor;
(5) taste.
Make a cross section.

Examples for Study.—Aconite (*do not taste aconite*), jalap, corydalis.

BULBS (*Bulbi*).

The *Bulb* consists of a short stem embraced by fleshy scales, which are modified leaves, or leaf-bases. Bulbs are called *scaly*, when the scales are thick but comparatively narrow (*e. g.*, the lily), or *tunicated* or *coated* when the scales envelop one another, forming crescentic layers (*e. g.*, the onion). The thick scales are food storehouses. (Compare *Corm.*)

Macroscopic Examination.—
Note: (1) size, shape and surface;
(2) odor;
(3) taste.
Study a cross section.

Examples for Study.—Scilla, Allium Cepa.

CORMS (*Cormi*).

The *Corm*, or *solid bulb*, is a thickened underground stem often broader than high, and partakes of the character of both bulb and tuber. The reserve food material is contained in this modified stem. (Compare *Bulb* and *Tuber*). Rootlets are attached to the corm.

Macroscopic Examination.—Same as for Tuber, which see.

Examples for Study.—Arisæma, cyclamen, colchicum, trillium.

WOODS AND TWIGS (*Ligna et Stipites*).

The *Woods* in medicine occur chiefly as chips, billets, fragments, or in coarse powder.

Twigs are overground stems and branches of herbaceous perennials, or suffruticose plants deprived of leaves, flowers, or fruits. They are composed of a column of woody substance surrounding a pith, and have a green or greenish bark—*e. g.*, *Bittersweet.*

Macroscopic Examination.—
Note: (1) size and shape (flat, curved, quilled, etc.);
(2) consistence (dense, woody, pithy);
(3) color;
(4) odor;
(5) taste (bitter, sweet, acrid, etc.);
(6) does it yield color or stain the saliva?

Examples for Study.—*Wood*—Quassia, guaiac, hematoxylon, red saunders. *Twigs*—Dulcamara.

BARKS (*Cortices*)

The term *Bark* is applied to that portion of the stem or root external to the cambium layer, which separates it from the wood of the plant. Barks consist of an inner or white layer or fibrous bark called *liber* and composed of bast cells; the middle or green bark, which is a cellular layer, containing the sap and chlorophyll (green coloring matter); and the outer bark or *cortical layer* (*cortex*), often called the brown bark, though it may present all shades from white to almost black and is modified (suberized) so as to prevent maceration of the bark by water. When very thick the outer layer constitutes *cork* (as in the cork oak). The official barks

may differ from these distinctions in consisting of one or more of the botanical layers.

Macroscopic Examination.—

Note: (1) whether whole bark or only a layer or two;
(2) size and shape (thick, thin, flat, quilled, etc.);
(3) surface, external and internal (rough, smooth, striated, etc.);
(4) fracture (appearance and color of fractured surface);
(5) color;
(6) odor;
(7) taste.

If in powder, note the characteristics.

Examples for Study.—Cascara sagrada, cinchona, cornus, myrica, granatum, ulmus, sassafras, cinnamon (varieties), black haw, wild cherry, white oak, rubus, cotton-root bark.

HERBS (*Herbæ*).

Herbs, in materia medica, consist chiefly of the smaller stems with their leaves, flowers, and fruits. Some algæ, such as Irish moss, and some lichens, such as Iceland moss and lungwort (*Sticta pulmonaria*), are included among the herbs.

Macroscopic Examination.—

Note: (1) general appearance;
(2) shape of stems and manner of division;
(3) kind of leaves (see leaves);
(4) form of flower or fruit (see Flowers and Fruits);
(5) color;
(6) odor;
(7) taste.

Examples for Study.—Peppermint, spearmint, lobelia, pulsatilla, chelidonium, eupatorium, absinthium, drosera, euphrasia, St. John's wort, marrubium, hedeoma, scutellaria, tansy, cannabis, scoparius, maidenhair, thuja, gold-thread, epilobium, yarrow, bladder-wrack, Iceland moss, Irish moss, sticta.

LEAVES AND LEAFLETS (*Folia et Foliola*).

The *Leaf* is the expanded stem appendage whose office is to nourish the plant by absorption of gases and solar energy to be used in the growth and motion of the plant. Leaves are simple and compound. They are either net-veined (reticulated) or parallel veined. They are petiolate when narrowly prolonged at their point of attachment, or sessile when devoid of such prolongation. Leaves are also entire, or notched, lobed, or divided, etc.

Macroscopic Examination.—

Note: (1) whether simple or compound;
(2) petiolate or sessile;
(3) size;
(4) shape (linear, lanceolate, oblong, oval, ovate (egg-shaped), orbicular (round or nearly so), oblanceolate, spatulate, obovate (reversed egg-shape), cuneate (wedge-shaped).
(5) margin entire, notched, toothed, lobed (divided less than half-way between margin and center of blade), cleft (when half-way or more), parted (when still deeper), or divided (when division reaches to the midrib), serrate (saw-toothed), dentate (toothed), crenate (scalloped), repand (wavy), sinuate (sinuous), incised (cut or jagged).
Shape at base: cordate (heart-shaped), reniform (kidney-shape), sagittate (arrow-shape), hastate (halberd-shape), or peltate (shield-shape).
Shape at apex: acuminate (pointed), acute, obtuse, truncate (cut off squarely), retuse (slightly notched), obcordate (reversed heart-shaped),

cuspidate (tipped with a sharp rigid point), mucronate (tipped with a short small point), aristate (long bristle form or extended mucronate).
(6) surface (smooth, rough, hairy, etc.).
(7) texture (thin, fragile, thick, leathery (coriaceous);
(8) color (both surfaces; translucent dots when held up to light—oil glands);
(9) odor;
(10) taste;
(11) venation.

Owing to the fact that compound leaves become disjointed in handling, the individual leaflets may be studied as simple leaves.

Examples for Study.—Digitalis, pilocarpus, eucalyptus, sage, coca, senna, hamamelis, buchu.

FLOWERS (*Flores*)

The *Flower*, often the most conspicuously showy part of a plant, consists of four parts: the *calyx* (or cup), composed of *sepals* and usually of a green color and surrounding the *corolla*, composed of the *petals;* within the corolla are the *stamens* or male organs of reproduction, and the *pistils* or female organs. The corolla is usually white or colored, rarely green. The terminal appendages of the stamens are called *anthers;* those of the pistil the *stigma*. The shaft of the pistil is known as the *style*. At the base of the pistil is the *ovary*, containing the *ovule* or *ovules*. The *seed* is the ripened ovule.

Dried flowers are usually broken and show only parts of the whole. They may be studied best by means of soaking them in water, and using a magnifying glass.

Macroscopic Examination.—
Note: (1) parts present;
(2) color;
(3) odor;
(4) taste;
(5) whether in bud, or partly or fully opened.

Examples for Study.—Arnica, saffron (stigma only), cloves (unexpanded flower buds), calendula, matricaria.

FRUITS (*Fructi*).

The *Fruit* (Fructus) is the matured ovary of a flower; sometimes with floral fragments which persist and take part in its development. The purpose of the fruit is embodied in the seed and "that portion external to the seed is important in the life-history of the plant only as it ministers to the maturing, transporting, or planting of the germ." Some fruits consist of a soft fleshy part, while a great number constitute the dry fruits, bearing a great variety of names, and having no soft or fleshy parts. Most of the medicinal fruits are of the *dry* varieties.

Macroscopic Examination.—
Note: (1) kind of fruit (soft or dry), berry, drupe (stone-fruit), achene (small, dry, one-seeded), grain, nut, follicle, capsule, legume (like peas), syconium (fig-like).
(2) shape;
(3) ripe or unripe;
(4) texture (outer and inner parts);
(5) color;
(6) taste;
(7) seed.

Examples for Study.—Cubeb, hops, phytolacca berries, prune, capsicum, colocynth, illicium, cardamom, coriander, fennel, fig, orange (peel).

SEEDS (*Semina*).

The *Seed* (Semen) is the final product of the flower—the result of fertilization and development of the *ovule*. Like the latter, from which it originates, it is invested by two (usually) *coats* or *integuments*—the outer, often hard and crustaceous and then called the *testa* or *shell*, and the inner, usually thin and delicate, the *tegmen*. The internal portion of the seed is the *kernel*. Seeds are variously marked and often fitted with outgrowths for easy dispersion by winds, water, and other agencies.

An *arillus*, *aril* or *arilode*, is a loose transparent bag enclosing some seeds, such as those of the water-lily. The arilode of the nutmeg constitutes the *mace* of commerce.

Macroscopic Examination.—
Note: (1) shape and size;
(2) color;
(3) taste;
(4) character and markings of the integuments (smooth, hairy, tufted, awned, grooved, raphe (ridge), hilum (stalk-scar).

Examples for Study.—Strophanthus, physostigma, staphisagria, linseed, colchicum, cacao, nux vomica, ricinus.

CELLULAR DRUGS.

Cellular Drugs. (Hairs, Pith, Spores, Glands, and Excrescences). The parts comprised under this heading form a small part of plant medicines. They need be but mentioned here, with examples of each. They are derived from plant sources but are not properly plant organs.

Macroscopic Examination. Examples for Study.—*Hairs:* Mucuna (cowage), cotton; *Pith*: Sassafras Pith; *Spores*: Lycopodium; *Glands*: Lupulin (from the strobiles of the Hop); *Excrescences*: Nutgall (the chief source of tannic acid).

(*b*) *DERIVATIVES OF PLANT DRUGS.*

INSPISSATED JUICES AND EXTRACTS (*Succi Inspissati et Extracta*).

Inspissated Juices and *Extracts* are indefinite exudates, usually of a black or brown color, yielding solutions of a brownish hue, and are wholly or partly soluble in water or alcohol. They often contain fragments of plant tissue. Two of them are insoluble in alcohol and water. These are Gutta-percha, which becomes plastic in hot water, and Caoutchouc or India rubber.

Macroscopic Examination.—
Note: (1) color;
(2) consistence;
(3) odor;
(4) taste;
(5) solubility.

Examples for Study.—Opium, aloes, extract of glycyrrhiza, guarana.

RESINS (*Resinæ*).

Resins (Resinæ) are non-volatile excretions or secretions of very indefinite composition, being chiefly oxidation products of essential oils of plant drugs. Loosely speaking they may be regarded as the alcohol-soluble constituent or constituents of vegetable drugs. Resins are fusible and combustible, yielding a sooty flame; are insoluble in water but dissolve in one or more of the following menstrua: alcohol, chloroform, ether,

fixed oils, essential oils, and some alkalies. When exuding from living plants they are usually in solution in essential oils. Resins are frequently mixtures of various resins and all are free from nitrogenous compounds. The precipitate falling upon adding alcoholic tinctures to water is usually resinous. Some resins contain benzoic and cinnamic acids. The latter are often referred to as *solid balsams*.

Macroscopic Examination.—
Note: (1) appearance;
(2) consistence;
(3) odor;
(4) color;
(5) taste;
(6) behavior with solvents.

Examples for Study.—Elaterium, guaiac, benzoin, resin (colophony).

GUMS (*Gummata*).

Gums are exudates having an insipid taste, insoluble in alcohol and ether. When treated with water they either dissolve to form a mucilage-like liquid, or soften to form a jelly-like adhesive mass or paste.

Macroscopic Examination.—
Note: (1) appearance;
(2) consistence;
(3) behavior with water.

Examples for Study.—Acacia, tragacanth.

GUM-RESINS (*Gummi-Resinæ*)

Gum-resins are milky exudates from plants and are composed of a gum or gums partly or wholly soluble in water, and a resin or resins soluble in alcohol. Gum-resins, when triturated with water, yield emulsions, the gum constituent dissolving more or less while the resin is mechanically suspended in the solution.

Macroscopic Examination.—
Note: (1) appearance;
(2) consistence;
(3) odor;
(4) color;
(5) taste;
(6) comparative solubility in alcohol and water;
(7) emulsify a portion.

Examples for Study.—Asafetida, myrrh, scammony.

OILS AND FATS.

Oils (Olea) are fluid substances, and *Fats* solid or semisolid bodies, having a more or less greasy or unctuous feel. The oils are (1) *Fixed* or *Non-Volatile Oils* (*Olea Pinguia*); (2) *Volatile* or *Essential Oils* (*Olea Volatilia*).

Fats and *Fixed Oils* are organic substances of a semisolid or solid consistence, greasy to the touch, and soluble readily in chloroform, ether, and volatile oils, or other fats. They are insoluble in water or glycerin. They are composed chiefly of the radical glyceryl (C_3 H_5) in chemical union with fatty acids (stearin, palmitin, and olein). Heated in the presence of alkalies they form soaps, and one of the by-products is glycerin

($C_3 H_5 (O H)_3$), a triatomic alcohol. Fats and fixed oils are obtained chiefly by the process of expression. They leave a greasy stain upon paper.

Macroscopic Examination.—As for *Inspissated Juices*, which see.

Examples for Study.—*Oils.*—Castor oil, cottonseed oil, cod-liver oil, croton oil (do not taste or touch), lard oil, olive oil, expressed almond oil; cocoa butter.

Fats.—Lard, suet, wool-fat, spermaceti.

Volatile or *Essential Oils.*—These are aromatic inflammable liquids, resembling the fixed oils only in solubility. Some are fragrant, others disagreeably odorous. They dissolve in alcohol and ether in varying proportions, very slightly in water, are usually colorless or yellowish, and resinify, by oxidation, upon exposure to the air. They are separable usually into a crystallizable portion, or *stearopten* (also called camphors—see *Camphors*), and a fluid portion, or *elæopten*. Though nearly all are compound organic bodies, one—oil of birch—is nearly pure methyl salicylate, and oil of wintergreen is very similar. They do not leave a greasy stain upon paper.

With but one or two exceptions, they are obtained by distillation.

Macroscopic Examination.—As for *Inspissated Juices*, which see.

Examples for Study.—*Volatile Oils.*—Oils of orange, anise, cade, cajuput, caraway, clove, worm-seed, coriander, cubeb, eucalyptus, fennel, juniper, lavender, lemon, peppermint, spearmint, nutmeg, tar, pine-needles, allspice, rosemary, santal, sassafras, thyme, mustard (do not taste, and smell very cautiously), and turpentine.

Stearoptens (secondary alcohols).—Menthol, eucalyptol, camphor.

CAMPHORS (*Camphoræ*).

Camphors (Stearoptenes or Stearoptens), both physically and chemically, are closely allied to the *Volatile Oils*, which see. They constitute one of the elements of many of these oils, and may be separated from them by subjecting the oils to a cooling process (*e. g.*, Menthol from peppermint oil). Camphors, at ordinary temperatures, are (mostly) solid bodies, but may be easily melted or sublimed. They dissolve in alcohol and are insoluble in water. Many of them possess the characteristic of liquefying when triturated with molecular parts of hydrated chloral.

Macroscopic Examination.—

Note: (1) appearance;
(2) smell;
(3) taste;
(4) solubility;
(5) behavior when triturated with chlorate hydrate. A similar behavior takes place when about equal parts of camphor, menthol, and thymol (a phenol), all of which are solids, are triturated together.

Examples for Study.—Camphor, menthol.

OLEORESINS (*Oleoresinæ*)

Oleoresins are the natural solutions of resins in essentials oils, and the latter are capable of separation by distillation.

Macroscopic Examination.—As for *Inspissated Juices*, which see.

Examples for Study.—Oleoresins of capsicum, ginger, cubeb, black pepper (be careful not to taste all the preceding without dilution), and male-fern.

BALSAMS (*Balsama*).

Balsams are resins or oleoresins containing cinnamic or benzoic acids, or both. They may be liquid or solid.

Macroscopic Examination.—As for *Inspissated Juices*, which see.

Examples for Study.—Balsam of Peru, balsam of tolu, storax.

WAXES (*Ceræ*).

Waxes are compounds of fatty acids with certain alcohols and differ from fats chiefly in containing no glyceryl. They are of varying degrees of solidity, melt when heated, and at a low temperature are brittle. The most familiar example is beeswax.

Macroscopic Examination.—As for *Inspissated Juices*, which see.
Examples for Study.—Yellow wax, white wax.

SUGARS (*Sacchara*).

Sugars have a sweet taste, are soluble in water and in diluted alcohol, but insoluble in ether. Sugars are solid and liquid. The following, modified from Maisch, is a convenient classification:

I. *Solid Sugars:*

Crystalline; non-fermentable; does not reduce cupric oxide.—Saccharum (cane sugar).
Fermentable; reduces cupric oxide to cuprous oxide.—Saccharum uveum (grape sugar).
Fermentable; contains mucilage and mannit.—Manna.
Gritty; white; not forming syrup.—Saccharum lactis (sugar of milk).

II. *Liquid Sugars:*

Brown; somewhat empyreumatic.—Syrupus fuscus (molasses).
Brown; aromatic; gradually becomes granular.—Mel (honey).

Macroscopic Examination.—
Note: (1) solid or liquid;
(2) taste;
(3) odor;
(4) solubility;
(5) behavior with Fehling's solution of copper and soda.
Examples for Study.—Sugar, sugar of milk, glucose, manna, honey, molasses.

FECULA.

Fecula (diminutive of *fæx*, sediment) has reference to the starchy part of a seed or other part of a plant. More loosely it is applied to a sediment subsiding from an infusion or mixture.

1. *Starch* is one of the most important derivatives of plant cells, and is prepared from "amylaceous seeds, tubers, rhizomes, and palm-stems" (Maisch). It occurs as granules usually having a laminated arrangement around a center (hilum or nucleus). The character of the lamination and the average size and shape of the granule are important aids in the differentiation and identification of plant-drugs and the detection of adulterations. Starch is insoluble in ordinary solvents, but swells (finally dissolves—according to Hatcher and Sollman) in boiling water to form a peculiar jelly-like or mucilaginous paste (starch paste), which acquires a deep blue color when treated with iodine.

2. A mixture of substances deposited from plant juices by sedimentation.

Macroscopic Examination.—

(1) appearance;
(2) taste;
(3) behavior with cold and boiling water;
(4) behavior of starch paste with tincture of iodine.

Examples for Study.—1. Corn starch (official), potato starch, wheat starch, rice starch, barley starch, sago, tapioca, oatmeal. Most of these, except the first two, are largely admixtures with gluten and other substances. A miscroscopic examination would be interesting and more productive than a macroscopic study of them.

2. Elaterium (properly a resin, see *Resins*, but deposited in the fecula of the juice of the squirting cucumber).

COLORING MATTER.

Coloring Matter.—Plant drugs, and some of insect origin (cochineal) possess coloring properties due to pigments contained in them, the nature of which is as yet undetermined.

Macroscopic Examination.—As for *Inspissated Juices*, which see.

Examples for Study.—Chlorophyll (green) in all green plant drugs; carminic acid (brilliant red) in cochineal; curcumin (yellow) in turmeric; hæmatoxylin (deep red) in logwood; carthamin (orange red) in saffron.

TANNINS

Tannins are amorphous, non-nitrogenous bodies, having an astringent taste, and striking a blue-black or green-black color with ferric salts. Tannins are widely distributed, especially in barks and leaves. Most of them form precipitates with albumen, alkaloids and many metallic salts, particularly with iron salts. For this reason they are of especial interest to prescribers who would avoid the preparation of unsightly mixtures, or of dangerous precipitates. Powerful alkaloids, thus precipitated, would be apt to be taken in the last doses of a bottle of medicine in which there had been a failure "to shake the bottle". Tannins are soluble in water, glycerin, and alcohol; sparingly in ether. Tannins have been divided by some into (1) "*physiologic tannins*" because they are produced in normal tissues; these stain greenish-black with ferric salts; and (2) into "*pathologic tannins*" produced by disease processes and usually precipitated bluish-black with iron salts. An example of the latter is the official *tannic acid*, often known merely as *tannin* and derived from nutgall. There are many peculiar tannins differing slightly, such as occur in cinchona, granatum, hamamelis, uva ursi, and other plant-drugs.

Macroscopic Examination.—Preparations of drugs above mentioned containing peculiar tannins may be examined by testing with iron-salts and observing the precipitate.

Examples for Study.—Tannic acid, preparations of cinchona, uva ursi, krameria, hamamelis, chestnut, pomegranate.

(*c*) *PROXIMATE AND OTHER PRINCIPLES OF PLANT DRUGS.*

ALKALOIDS.

Alkaloids are organic bodies derived chiefly from plants in which they are believed to exist in combination with organic acids. They are basic substances, containing carbon, hydrogen, and *nitrogen* (hence called nitrogenous principles); a few liquid alkaloids also contain oxygen. Alkaloids unite with acids to form salts, after the manner of ammonia. These salts

are usually well-defined and colorless (berberine is yellow), odorless, crystalline, and soluble. If the salts be formed with the halogen acids, the prefix *hydro* is generally used in naming them. Most alkaloids are bitter, slightly alkaline, soluble in ether and chloroform, often less readily in alcohol; in water they are comparatively insoluble. On the contrary, the solubility of their salts is usually the reverse—water freely dissolving them, while they are practically insoluble in ether and chloroform. Of the alkaloidal salts the chlorides are generally the most easily soluble; and the ready solubility of the salts of alkaloids have caused them to be preferred to the alkaloids themselves for therapeutic uses. All the important alkaloids produce profound physiologic and pharmacologic effects; many of them are the most poisonous of known substances; the latter are functional or physiologic poisons and leave (usually) no post mortem physical lesions. As a rule, alkaloids are the purest bodies derived from plant structures without disintegration (proximate principles). Their chemical composition is not fully understood. While alkaloids and their salts have distinctive therapeutic properties of their own, *they do not fully nor exactly represent the action of the whole drugs from which they are derived.*

The names of alkaloids should end in *ine* (English), or *inum* (Latin).

Historic Note.—The first vegetable alkaloid (morphine) was discovered by Sertürner, a Hanoverian chemist and apothecary, between 1805 and 1816, and announced in the latter year, though Derosne and Seguin, two French chemists, had separated it, as well as narcotine, as early as 1803 and 1805, without recognizing their difference, or establishing their alkaloidal nature.

As a matter of historic interest we have compiled the following table, which includes the most important alkaloids, and their discoverers, date of discovery, and doses. The maximum doses of the potent alkaloids named should not be exceeded, nor seldom should even the full amount be used, especially as an initial dose.

ALKALOID	DISCOVERED BY	DOSE
Morphine	Sertürner, 1805-1816	⅛ to ¼gr. (salts).
Narcotine	Derosne, 1803 (see above); Robiquet, 1817	1 to 3 gr.
Emetine	Pelletier and Magendie (impure), 1817	1-100 to 1-60 gr. (emetic 1-6 gr.)
Veratrine	Meissner, 1818	1-100 to 1-60 gr.
Strychnine	Pelletier and Caventou, 1818	1-80 to 1-25 gr. (salts).
Hyoscyamine	Runge (as Koromeygn), 1819; Peschier, 1821	1-200 to 1-100 gr. (salts).
Piperine	Oersted, 1819	1 to 10 gr.
Delphinine	Brandes, Lassaigne and Fenuelle, 1819	⅛ to ½ gr.
Brucine	Pelletier and Caventou, 1819	1-60 to 1-6 gr.
Quinine	Pelletier and Caventou, 1820	1 to 20 gr. (salts).
Cinchonine	Gomez (named), 1812; established by Pelletier and Caventou, 1820	1 to 20 gr. (salts)
Solanine	Desforses, 1820	
Caffeine	Runge, 1820	½ to 3 gr. (salts), 1 to 5 gr.
Colchicine	Pelletier and Caventou, 1820; later established by Geiger and Hesse	1-150 to 1-50 gr. (salts).
Chelidonine	Godefroy, 1825; Dana (Sanguinarine), 1829; pure by Probst, 1838	
Corydaline	Wachenroder, 1826	
Berberine	Hüttenschmid(?), 1824; Pelletier and Caventou, 1826	5 to 10 gr. (salts).
Curarine	Roulin and Boussingault, 1828	1-400 to 1-100 gr.
Nicotine	Posselt and Riemann, 1829	1-6 to 1 gr.
Atropine	Mein, 1830	1-200 to 1-100 gr. (salts).
Coniine	Giesecke, 1827; pure and established by Geiger, 1831	1-60 to 1-30 gr.
Codeine	Robiquet, 1832	¼ to 2 gr. (salts).
Aconitine	Geiger and Hesse, 1833	1-600 to 1-300
Lobeline	William Proctor, Jr., 1838	½ to 1 gr. (salts).
Cinchonidine	F. L. Winkler, 1847	1 to 20 gr. (salts).
Hydrastine	Alfred B. Durand, 1850	⅛ to ½ gr. (salts).
Trimethylamine (both of animal and vegetable origin)	Wertheim, 1830	½ to 3 gr.
Sparteine	Stenhouse, 1851	⅛ to ¼ gr.
Gelsemine	Henry Kollock, 1855	1-150 to 1-50 gr.
Cocaine	Gædecke (as erythroxyline), 1855; named Cocaine by Niemann, 1860	⅛ to 1 gr. (salts).
Physostigmine	Jobst and Hesse, 1864	1-150 to 1-50 gr. (salts).
Pilocarpine	E. Hardy (France) and A. W. Gerrard (England) almost simultaneously, 1875	⅛ to ¼ gr. (salts).
Calabarine	Harnack and Urtkowski, 1876	1-100 to 1-20 gr.
Pelletierine (a mixture of several alkaloids)	Tanret, 1878, 1880	3 to 6 gr. (salts 4 to 8 gr).
Gelseminine	F. A. Thompson, 1887	1-150 to 1-50 gr. (salts).

Poisoning by Alkaloids.—As many of the alkaloids are extremely poisonous, it is well to remember that the initial treatment consists in chemical destruction or occlusion of the alkaloid; and subsequent evacuation of it. While each alkaloid, when taken by mouth, will require its own special chemical antidote, if any be known, and if by mouth or hypodermic, its own physiological antagonist, the following general methods and drugs may be used:

Tannin (tannic acid or common store tea may be used) precipitates most alkaloids. As the precipitate redissolves in the acid gastric juice it should be given with alkaline substances, as sodium carbonate or bicarbonate: and then removed by emesis or by means of the stomach pump.

Iodine in the form of Tincture of Iodine diluted, or Lugol's Solution (Iodine with Potassium Iodide) may be given as a general antidote, but as the precipitate redissolves in the alkaline juices of the intestines it should be hurried through the bowels by means of a purgative, if too late to remove it by emesis or the stomach pump. Diluted alkalies may be used to precipitate alkaloids.

Animal charcoal occludes alkaloids, as does Hydrated Silicate of Aluminum (Lloyd's Reagent). These may be used if quickly removed from the stomach before re-solution takes place.

Potassium Permanganate (15 to 50 grains in a pint of water) has been advised. It forms a precipitate with alkaloids, but can only do so when its own integrity is secured. As it is at once destroyed by organic matter, it can only be of service when the stomach is comparatively empty. Its precipitate is not redissolved in the intestinal canal. (See also *Acute Poisoning, Antidotes and Treatment.*)

GLUCOSIDES.

Glucosides are organic plant principles, usually of a neutral character. Their distinguishing property is that of splitting into glucoses, or into glucose-yielding sugars and some other bodies, when heated in the presence of acids or alkalies, or when in contact with some unorganized ferments. Always one product of such disintegration is some form of glucose. They all contain carbon, hydrogen, and oxygen. Some of them, like ergotinic acid (a glucoside with sapotoxic action) contain nitrogen, very rarely sulphur. They vary greatly in solubility, but nearly all are soluble in alcohol and a very few are dissolved by ether. In plants glucosides are frequently associated with alkaloids, and in many instances they constitute the active ingredient of a drug.

The names of glucosides end in *in* (English) and *inum* (Latin). The following are among those of interest in therapeutics: Salicin (in Salix and Populus species); arbutin (in uva ursi); cathartin [cathartic acid] (in senna); digitalin, digitoxin, digitalein, and digitonin (in digitalis); strophanthin (in strophanthus); convolvulin (in jalap); glycyrrhizin (in liquorice-root); colocynthin (in colocynth); jalapin (in scammony); amygdalin (in bitter almond); convallamarin (in lily of the valley); adonidin (in adonis), etc.

SAPONINS.

Saponins are plant constituents belonging to the glucosidal group (breaking up in the presence of acids or ferments into glucose [grape sugar], and inactive and unknown bodies). They possess the characteristic quality of foaming when shaken with water. Many of them are innocuous; others extremely poisonous. To the latter are given the name *Sapotoxins;* while the term *Saponin* is reserved for the inactive and less active of these bodies. The chief saponins and sapotoxins are *saponin* and *saporubrin* [methyl-sapotoxin] (in soapwort or *Saponaria officinalis*); *senegin* (in senega or *Polygala Senega*); *quillaja-sapotoxin* (in soap bark, *Quillaja Saponaria*); *cyclamin* (in sowbread, *Cyclamen Europeum*); *chamælirium-sapotoxin* (in blazing star, *Chamælirium luteum*); and *parillin*, *sarsa-sapotoxin* and *sarsaparill-saponin* [*smilacin*], (in sarsaparilla, *Smilax officinalis*).

AMAROIDS.

Amaroids, *Bitter* or *Neutral Principles*, are neutral or but feebly acid bodies devoid of basic qualities. Many of them are bitter. They vary greatly in composition and properties, and lack characters which would place them in the classes with alkaloids, glucosides or other plant constituents. Unlike glucosides they are not split into glucoses, and unlike alkaloids are not percipitated by Millon's Test Reagent nor by Tannic acid. Like the glucosides the names of these preparations end in *in* (English), and *inum* (Latin). The most notable examples are aloin, elaterin, santonin, cantharidin, quassin, picrotoxin, chrysarobin, etc.

FERMENTS.

Ferments are peculiar bodies existing in or formed in the chemic manipulations of both plants and animals, and known chiefly by the changes they produce in other bodies. They have not been isolated as pure principles, but some of the bodies containing them are in common use:

(1) Of animal origin: *pepsin* (in gastric juice); *pancreatin* (in pancreatic juice); *ptyalin* (in saliva)

(2) In plant substances: *emulsin* (in almond and peach, cherry, etc.); *diastase* (in cereals); *myrosin* (in mustard-seed); *papain* [*papayotin*] (in West Indian papaw juice); *bromelin* (in pineapple juice), etc.

ORGANIC ACIDS.

Organic Acids are devoid of N. but contain carboxyl (CO_2H) joined with a hydrocarbon residue. They form salts with bases, and have the general properties of acids. As types may be named: acetic, salicylic, tannic, citric, malic, oxalic, oleic, benzoic, and a number of similar acids.

III. PHARMACEUTICAL FORMS OR CLASSES OF MEDICINES.

Medicines are divided into three classes, viz.: *Solids*, *Liquids*, and *Gases* or *Vapors*.

The chief solid (some semisolid) forms are the *powder*, *trituration*, *tablet*, *poison tablet*, *pill*, *granule*, *mass*, *effervescent salts*, *extract*, *resin*, *oleoresin*, *confection*, *wafer*, *capsule*, and *lozenge*. For external use are the *poultice*, *ointment*, *cerate*, *plaster*, *paper*, and *suppository*.

The principal liquids are the *aromatic* or *medicated water*, *infusion*, *decoction*, *vinegar*, *mixture*, *elixir*, *glycerite*, *mucilage*, *emulsion*, *collodion*, *solution*, *juices*, *oils*, *magma*, *spirit*, *fluidextract*, *specific medicine*, *colloidums*, *tincture*, *syrup*, *honey*, *enema*, *eye-wash*, and *wine*. For external use, the *liniment*, *lotion*, *oleate*, and *bath*. Serums and vaccines are special biologic products usually of liquid or semi-liquid form, and intended for subcutaneous or intramuscular injection or intracutaneous application.

Gaseous medicines are usually employed as *inhalations*, or as *vapors*, produced by means of atomization, with a spray-apparatus, nebulizer, or other means.

While the foregoing are in groups, the following are arranged in alphabetic order in order to facilitate consultation:

Waters.—(*Aquæ*) **Medicated Waters** (*Aquæ Medicatæ*) are solutions of volatile substances, usually of oils or camphors, in water. **Aromatic Waters** (*Aquæ Aromaticæ*) are solutions prepared by several methods, as by direct solution in hot or cold water, or by filtering water through some inert powder or cotton impregnated with the volatile body. Unless otherwise directed they are to be prepared by triturating two parts of the volatile ingredient with 15 of talc and abstracting by filtration with 1,000 parts of boiled distilled water. They are employed chiefly as vehicles. Example: Aqua Menthæ Piperitæ.

Baths (*Balnea*) are general washes designed to be applied to the whole surface of the body. They may be *simple* or *medicated*.

Cachets or **Wafers** (*Cachetæ*) are molded forms of flour or starch and water for the administration of dry powdered drugs. They hold more, and more readily dissolve than the capsule and are easily swallowed if previously dipped in, or floated into the mouth, on water.

Capsules (*Capsulæ*).—Telescoping gelatin containers for the administration of medicines. They dissolve readily in the stomach, thus liberating the medicament. They are often to be preferred to pills. Soft capsules are sometimes used for administering balsamic and oily fluids.

Cerates (*Cerata*) are unctuous bodies intermediate in consistence between the ointment and plaster. They are sufficiently soft to be easily spread upon muslin with a spatula, and when applied to the skin adhere, but do not become soft enough to liquefy at the body temperature. The most abundant constituent is wax, hence their name. They are (1) *simple* and (2) *medicated*. Examples: (1) Ceratum, (2) Ceratum Cantharidis.

Collodions (*Collodia*) are fluid solutions of gun-cotton (pyroxylin), in a mixture of alcohol and ether, or of acetone. They may be (1) *simple* or (2) *medicated*. Collodia are used externally. Examples: (1) Collodium; (2) Collodium Cantharidatum.

Colloidums. See under *Specific Medicines*.

Confections (*Confectiones*), which also include *electuaries* and *conserves*, are soft pasty solids, composed of vegetable bodies or active drugs, preserved by means of sugar or honey, or both. Example: Confectio Rosæ.

Decoctions (*Decocta*) are freshly prepared aqueous solutions of the soluble principles of vegetable drugs, but, unlike infusions, are prepared by *boiling* the drug in water. The same remarks regarding the strength of infusions apply to decoctions; one part of drug to twenty parts of water, unless otherwise specified. Decoctions are usually boiled for fifteen minutes and then allowed to cool. After cooling and straining, the preparation

should be made to measure up to the original quantity of menstruum by the addition of cold water passed through the mass in the strainer. Remember that the process is the opposite to that for preparing infusions. In the latter, hot or cold water is employed, and if hot, the product is allowed to *cool;* in the decoction, cold or warm water is employed and the preparation is *boiled.* Example: Decoctum Granati Radicis.

Effervescent Salts (*Sales Effervescentes*).—Mixtures in the form of a fine or a granulated powder of soluble chemical compounds with citric or tartaric acid, or both, and sodium bicarbonate. When added to water they form an effervescent draught which should be swallowed while it is foaming. Example: Sodii Phosphas Effervescens.

Elixirs (*Elixiria*) are sweetened, aromatic and spirituous solutions, designed as vehicles for small amounts of active medicines. As a class they are very unsatisfactory, though pleasant, preparations. Example: Elixir Glycyrrhizæ.

Emulsions (*Emulsa* or *Emulsiones*).—Aqueous fluid preparations holding in suspension oils or resinous substances by means of mucilaginous or viscid media. As the latter, acacia or tragacanth is often employed. Examples: Emulsum Olei Morrhuæ, Emulsum Asafœtidæ (milk of asafetida).

Enemas (*Enemata*) or **Clysters** (*Clysteria*) are fluids designed for injection into the rectum. They may be (1) *simple,* or (2) *medicated,* or (3) *saponated.* Examples: (1) water, (2) Enemata Terebinthinæ, (3) soap suds.

Extracts (*Extracta*) are prepared by evaporating the solutions, alcoholic or otherwise, of vegetable medicines at a low heat. They are either solid or semisolid in consistence. They may be (1) *simple* or (2) *compound.* Powdered extracts are fine dry powders. Examples: (1) Extractum Aconiti, (2) Extractum Colocynthidis Compositum, (3) Powdered Extract of Cascara Sagrada.

Eye Washes (*Collyria*).—Fluids designed to cleanse or locally medicate the eye. Example: Collyrium Acidi Borici.

Fluidextracts (*Fluidextracta* or *Extracta fluida*) are fluid alcoholic preparations of vegetable drugs, prepared by percolation, and subsequent concentration of a portion of the percolate by evaporation. Alcohol constitutes the bulk of the menstruum, though water and glycerin and sometimes acids, in varying proportions, are often used with it. Ether is also employed, as in Fluidextract of Lactucarium. Fluidextracts of Triticum and Castanea are prepared most largely with boiling water.

Fluidextracts are so constructed as to represent one grain of the crude drug in each minim of fluidextract. As a part of this one grain is made up of the extracted inert matter—plant dirt—the preparation can not be said to represent the active constituents of the drug, grain for minim. Though designed to be uniform unless they are standardized they may vary in actual medicinal strength. Many fluidextracts throw down a precipitate when mixed with water. They are, as a rule, concentrated tinctures. They may be (1) *simple* or (2) *compound.* Examples: (1) Fluidextractum Lobeliæ; (2) Fluidextractum Sarsaparillæ Compositum.

Glycerites (*Glycerita* or *Glycerines* or *Glyceroles*) are mixtures or solutions of medicines in glycerin. They are intended for both external (chiefly) and internal exhibition. Example: Glyceritum Hydrastis.

Granules (*Granula*).—Very small pills.

Honeys (*Mellita*) are preparations related to the syrups, but differing in the substitution of clarified honey for syrup. Example: Mel Rosæ.

Infusions (*Infusa*) are solutions of the soluble constituents of vegetable drugs prepared usually by pouring upon the drug hot water and allowing the product to macerate and cool. If the properties of the drug are impaired by hot water, cold water is employed. They are often prepared of the strength of one part of the material to sixteen of water; unless otherwise specified they should be prepared of one part of drug to twenty of water for ordinary infusions. The finished product should be made to measure up to the original quantity of menstruum, by passing, if necessary, the required amount of cold water through the mass in the strainer. The strength of infusions of powerful drugs, like digitalis, should always be indicated in the physician's prescription. In the absence of this the official infusion should be dispensed. Infusions differ from decoctions in not being prepared by boiling. Example: Infusum Digitalis.

Juices (*Succi*).—Fresh juices of vegetable drugs preserved by a small amount of alcohol. Example: Succus Solani.

Liniments (*Linimenta*) are fluid, or semifluid preparations, usually oleaginous, though alcohol or even water may be employed as the base, intended for external use, and to be applied with friction. Cotton seed oil or olive oil is usually preferred as a base. Some liniments are perfect solutions, while others are mere mixtures; certain soft solids,

which will liquefy at the temperature of the body, are also denominated liniments. Most liniments, except Linimentum Calcis, are designed to be rubbed into the skin. Example: Linimentum Chloroformi.

Lotions (*Lotiones* or *Washes*) are solutions of medicinal bodies in water or other menstrua, designed chiefly to be applied to localized regions for their topical influence. They are (1) *simple* or (2) *compound*. Examples: (1) Lotio Alkalini; (2) Lotio Myrrhæ Composita.

Lozenges (*Troches* or *Trochisci*) are solid, candy-like masses, usually flattened and discoid or round or cylindrical in shape, composed of powdered drugs combined with sugar and mucilage, and sometimes flavored. They are designed to influence the mouth or throat. Example: Trochisci Acidi Tannici.

Masses (*Massæ*).—Soft solid substances that may be preserved in bulk and usually intended for the formation of pills. Often called *pill-masses*. Example: Massa Hydrargyri.

Milk (*Magma*) an aqueous suspension of very finely divided particles of insoluble chemicals produced at the time of preparation. Example: Magma Magnesiæ (Milk of Magnesia).

Mixtures (*Misturæ*) are aqueous fluid preparations, holding in suspension insoluble or partially soluble powders, or other substances. Mixtures are intended for internal use. Example: Mistura Cretæ.

Mucilages (*Mucilagines*) are more or less viscid, thick, and adhesive fluids, prepared by extracting the mucilaginous constituents of plants with water, or aqueous solutions of gums, or of starch, as these bodies swell with water. Some are prepared with heat, while others are not. Mucilage of slippery elm, and some others, are best prepared with ice-cold water. Example: Mucilago Amyli.

Oils (*Olea*).—Solids, semisolids, and fluid, greasy, and water insoluble preparations obtained by expression or by maceration and distillation: I. *Olea Pinguia* (Fixed Oils and Fats). Non-volatile neutral esters of animal or vegetable origin, and chiefly glycerol compounds of oleic, palmitic and stearic acids. Example: Oleum Lini (liquid) and Oleum Theobromatis (solid). II. *Olea Volatilia* (Volatile or Essential Oils): Odorous volatile liquids derived from aromatic plants and containing or consisting of neutral principles, esters, phenols, aldehydes, ketones, etc. Example: Oleum Menthæ Piperitæ.

Oleates (*Oleata*): Solutions of alkaloids or of other solids in oleic acid, intended for external application. Example: Oleatum Hydrargyri.

Ointments (*Unguenta*) are fatty preparations of about the consistence of cold lard, which substance benzoinated (or petrolatum) usually constitutes their bulk. Some contain either one or more of the following: hydrous wool fat, or glycerin, wax, paraffin, spermaceti, expressed oil of almond, or prepared suet, according to the use to be made of them. When applied to the skin they are softened and rendered fluid by the heat of the body. They may be medicated or unmedicated, and are applied generally by inunction, hence their name. Example: Unguentum Belladonnæ.

Oleoresins (*Oleoresinæ*) consist generally of oils (fixed and essential) associated with resins, and extracted from the crude drug by means of ether, acetone, or alcohol, the solvents being subsequently evaporated. Example: Oleoresina Capsici.

Papers (*Chartæ*).—Paper impregnated with or coated with medicinal substances, and designed for external application. Example: Charta Sinapis.

Pills (*Pilulæ*) are small, ovoid, spherical, or lenticular bodies, composed of a medicine, or medicines, combined with substances termed excipients, such as soap, mucilages, confection of rose, etc., which cause them to retain their shape and firmness. Pills are usually composed of active substances; are generally sugar or gelatin coated, sometimes gilded or silvered, and are intended to be swallowed whole. Those intended for solution in the intestines only are coated with keratin. A very large pill is denominated a *bolus*. Pills are (1) *simple* and (2) *compound*. Examples: (1) Pilulæ Aloes; (2) Pilulæ Aloes et Myrrhæ.

Plasters (*Emplastra*) are tenacious substances usually spread upon some kind of pliable skin or fabric, and intended to be applied to the exterior of the body either for purposes of counter irritation or as simple adhesives. They require heat to spread them. When applied to the body they adhere but do not become soft. They are composed chiefly of lead plaster (oleate of lead) or some resinous body, and may be simple or medicated. Commercial plasters have largely supplanted those prepared by the ordinary pharmacist. Example: Emplastrum Capsici.

Poison Tablets (*Toxitabellæ*). Blue *Angular* tablets stamped with skull and crossbones and the word "*Poison*". They are designed to prevent mistakes and lessen the liability to poisoning from mercuric chloride. Example: Toxitabellæ Hydrargyri Chloridi Corrosivi.

Poultices (*Cataplasmata*) are formed of such substances as, when wet, will be more or less tenacious, and will accommodate themselves to parts to which they are applied. They are employed to soften and relax the tissues, and at the same time exclude the air, to stimulate, induce hyperemia, or to apply counterirritants. A poultice should be prepared from flax seed, elm, bread, bran or meal, as desired, by gradually adding them to hot water in a hot vessel, and spreading them in convenient thickness upon a hot fabric with a hot knife or spatula. Kaolin poultices—like plasmas—under various trade names, as Antiphlogistine, etc., are common and convenient applications. Libradol is a ready-prepared, magma-like plasma used as a medicated poultice. This and many of the kaolin preparations, owing to the glycerin present, act also as topical dehydrating agents. They may or may not be medicated. Examples: (1) Calaplasma Lini (Linseed or Flaxseed Poultice); (2) Libradol and Antiphlogistine (ready-prepared, magma-like plasmas used like poultices).

Powders (*Pulveres*) are solid medicines reduced to uncompacted particles of various degrees of fineness, by means of mechanical force, or by such means of precipitation as elutriation and levigation. The degrees of fineness in powders (in pharmaceutical manipulations) are officially designated by numbers, representing the greatest diameter of the powdered particle as measured by the full lumen of the mesh in the sieve through which the powder is passed. Medicinal powders (not those designed for pharmaceutical manipulations and numbered) are usually dispensed in papers (chartulæ), capsules, or cachets. Loosely the term "powders" is applied to single doses of a dry powdered drug dispensed in "powder papers" (chartulæ).

Powders are (1) *simple* and (2) *compound.* Examples: (1) Pulvis Rhei; (2) Pulvis Ipecacuanhæ et Opii (Dover's Powder).

Resins (*Resinæ*) are the solid, non-volatile or soft-solid resinous constituents of vegetable substances, usually prepared by precipitation of an alcoholic solution of the drug in simple or acidulated water, or by distilling the oil from oleo-resins. Resins are soluble in alcohol but not in water. Example: Resina Podophylli (podophyllin).

Serums and **Vaccines** (*Sera et Vaccina*). Biologic products known as *serums, vaccines* and *viruses,* designed chiefly for subcutaneous administration. They must conform to standards established by the United States Public Health Service, which has supervision and licensure over the firms preparing them. Examples: (1) Serum Antidiphthericum; (2) Bacterial Vaccines; (3) Virus Vaccinum.

Solutions (*Solutio*), or **Liquors** (*Liquores*) are such aqueous (mostly) solutions of non-volatile materials, as are not included in decoctions, infusions, syrups, and mucilages. Liquor Gutta-perchæ, or solution of Gutta-percha, is, however, an exception; this solution being effected by means of chloroform instead of water. Example: Liquor Potassii Arsenitis (Fowler's Solution).

Specific Medicines.—Specific Medicines are standardized preparations, usually liquids, more or less alcoholic, and generally of vegetable origin. They are derived from materials specially selected to produce the desirable therapeutic qualities, according to Specific Medication (which see). Consequently, some of the Specific Medicines derived from energetic drugs hold a different balance of toxic alkaloids or other constituents than that of the official fluidextracts and tinctures. They are designed for kindly therapeutic effect rather than for intense physiological activity. Therefore they are not as a class standardized for high proportions of toxic material, be it alkaloidal or otherwise, to the unbalance of the less pronounced drug constituents in the finished preparation.

They are prepared upon the premise that: Every drug contains closely related, inter-structural constituents; that every part of a plant is an inter-cellular complexity; and that no one constituent, whether educt or product, represents the drug as a whole. "In many cases a dominating substance becomes thus less valuable than its less vicious companions". The conspicuous alkaloid or resin of a drug may on these grounds be an enemy to its finer qualities.

In the vegetable Specific Medicines, the desirable structures of the drug are selected, and the undesirable excluded, as a rule, by the

discriminating actions of neutral solvents. The study of each drug and each part of a drug has been made with a view to balancing such interstructural complexities, a process usually ignored in pharmacy in the desire to give a preponderance of proportion of toxic constituents to a final product.

Specific Medicines have been developed under the auspices of Eclectic authorities, and are employed in Eclectic therapy because they are regarded as the logical as well as the best representatives of drugs, in balanced qualities, for specific purposes.

The primary exhausting solvent, when possible, is pure alcohol (never denatured or poisoned for commercial purposes), either strong, or appropriately diluted. The finished product is usually more or less alcoholic, that liquid being the best known preservative of some of the very delicate proximate principles of plant drugs.

Drugs possess individual qualities, hence the menstrua vary, both as to manipulation and final result, a specially-proportioned menstruum being generally required for each drug, in accordance with its particular condition. Hence, Specific Medicines are not the result of group processes, such as are applied to classes known as fluidextracts and tinctures. It must be recognized that Specific Medicines are not tinctures and are not fluidextracts, for they do not conform either to the authoritative definition or to the process required for producing these, or non-official preparations. They could not be properly classed as tinctures, on account of color, for some of them are colorless, a few are definite chemicals, some are acids, and others dry drug products. To the class the term *Specific Medicines*, originally applied, is both fair and comprehensive.

The drug strength of Specific Medicines, on an average, is about eight times that of the old-time commercial tinctures, although, as already stated, by reason of their origins and manipulative processes, comparisons are impossible.

The best vehicle for the administration of Specific Medicines is water. Some of them, when dropped into water, throw down resinous or oleaginous precipitates. These precipitates may carry therapeutic constituents, and should not be removed. Only after being stirred to uniform suspension should such mixtures be administered to the patient. Recent developments in plant pharmacy have given remarkable insight to plant structures, resulting in Colloidal Specific Medicines that now mix clear with water.

Historic Note.—Specific Medicines were devised, and given that name, in 1869, by Dr. John Milton Scudder. They were the outgrowth of a necessary movement for better as well as more representative medicines, necessitated by bad commercial conditions both previous to and at the time of their introduction. At first Scudder advised office pharmacy, and under the then-existing necessity, placed a series of copyrighted labels for the more important remedies in the hands of competent manufacturing pharmacists. These were offered free, and absolutely without fee or price, to legitimate pharmacists who would contract to procure the desired crude drugs and prepare them as directed. The name "Specific Medicines" was thus established, and the labels employed to protect physicians using these remedies, by insuring their integrity, proper preparation and quality. Firm after firm refused them, not caring to meet the exactions imposed, as well as hesitating to appear to be affiliated with the then often despiced group of American physicians known as Eclectic. Two drug houses finally undertook their preparation, but only one made a serious effort to meet Dr. Scudder's requirements. Many improvements in process of manufacture and quality of product, as well as the addition of many drugs to the list originally selected by Scudder, resulted. As the preparations upon which the Eclectic specific indications have been founded, they are universally employed by specific medicationists as well as progressive members of all schools of practice.

As Eclectics have been co-laborers in their evolution, and mostly employ these medicines in their practice they are given the preference throughout this work. Each Specific Medicine representative of the individual drugs considered, the dosage, and, in potent preparations, the usual manner of administration, is thus made a necessary feature in our pages. (See also *Colloidums*.)

Colloidums or *Colloidal Specific Medicines* are a recently perfected form of fluid preparations, carrying either in extremely minute dispersion or complete solution the desired medicinal non-crystalline or colloidal substances of plant drugs, the solutions as such being more readily absorbable than other forms of medicines. They have a varied menstruum according to the drug employed and usually contain less alcohol than the Specific Medicines. They represent the full medicinal values, minim for grain, of the drug employed according to the studies of the manufacturers. The flavor and color are natural, pure grain alcohol is used, and most of them mix without precipitation with water, alcohol, or glycerin. Colloidums are prepared by means of a special apparatus called a colloider.

[Colloid—The term *Colloid* originated with Thomas Graham (1805-1869), a Scotch scientist, who discovered the now well-known process of *dialysis* or the separation of crystalline (crystalloids) and non-crystalline (colloids) substances in solution by means of an animal diaphragm, usually of bladder or parchment. The term which thus referred to structureless substances, the best example of which is glue (*colla*, hence the name colloid—having the appearance of glue), outside of dialysis, played but little part in general chemistry, until revived in the last few years in the most important phase of *Colloidal Chemistry*, or the chemistry of formless (colloidal) life structures. It is now assumed that life depends upon water-dominated and disseminated colloidal or formless vitalized substances. "It seems," says Lloyd (Ellingwood's *New American Materia Medica, Therapeutics and Pharmacognosy*, 11th edition), "as though all that nourishes life structure as foods, as well as normal life structures thus served, are colloidal in their nature. Cast-off excretions (such as perspiration) carry crystalline salts, while urine is a prolific field of crystalline research (possibly salt and sugar may be cited as "crystalline" forms of food; possibly, too, both become *colloidal* before assimilation). But the stepping onward of normal biological processes, the transferring of vitality from colloidal cell to colloidal cell, or from colloidal created organisms to organisms concerned in the support of life, seems ever to lean upon the movements and actions of colloidal bodies, which in their formation, and transformation, produce derivatives that, if normal, are colloidal." Crystalline substances are found in the secretions and under certain diseased conditions, hence the dictum of Lloyd that "Life structures detest a crystal". The same author summarizes briefly as follows: "In their relationship to life, as this writer now views the problem, colloids may be classed as formless, vitalized structures (cellular, emulsion or serum), capable of creating, nourishing and even of *destroying* the very life of their host." "Colloids that take our care as pharmacists may be in liquid form, as serums, clear as water; an emulsion like milk or egg yolk, glutinous as egg albumen, or plastic as the jelly fish; or they may be, on the contrary, tough, dry, and hard, as horn" (ibid).

Colloids, according to Graham, are substances without definite structure which may be liquid, gelatinous or solid, colored or colorless, refuse to dialyze, or dialyze very slowly, and are at least, under ordinary conditions, without crystalline structure. Colloids may be either organic or inorganic, using those convenient but not strictly true older terms of chemistry. Colloidal dispersions represent particles infinitely smaller than the finest of powder particles produced by attrition, and as such remain in suspension when under like conditions the latter would precipitate. True colloidal solution results when these colloidal dispersions dissolve and the milkiness of suspension disappears. It is logical, therefore, that medicinal preparations in colloidal solution should be most active and assimilable according to nature's own plan.]

Spirits (*Spiritus*) are solutions of essential oils and other volatile substances in alcohol. They are practically the same as *essences*, but the latter are usually stronger, though prepared in the same manner. They are (1) *simple;* (2) *compound.* Example: Spiritus Camphoræ; (2) Spiritus Lavandulæ Compositus.

Suppositories (*Suppositoria*) are rolled, molded, or pressed solid bodies, usually prepared from cacao butter, glycerinated gelatin, or sodium stearate, and with or without some medicinal agent, and intended for introduction into the pelvic and other orifices. Sometimes wax or spermaceti is added to prevent them from melting during hot weather. Ten per cent Japan wax is to be preferred for this purpose. Example: Suppositoria Glycerini.

Syrups (*Syrupi*) are concentrated aqueous solutions of sugar or thick solutions of sugar in aqueous medicated or flavoring solutions. They are (1) *simple*, (2) *medicated*, or (3) *flavored.* Examples: (1) Syrupus; (2) Syrupus Pruni Virginianæ; (3) Syrupus Aurantii.

Tablets (*Tabellæ*). Small disk-like bodies prepared by molding or compression. Often they are but medicated candies, and when hard and old often fail to disintegrate in the gastro-intestinal canal and may pass unbroken in the feces. When made from permanent and readily soluble chemicals they form convenient medicines; but when prepared from delicate and volatile plant constituents, little dependence can be placed upon them. (1) *Tablet Triturates* are disks prepared from milk sugar triturations of drugs, with the addition of some excipient, or merely moistened with alcohol, to cause the ingredients to adhere together. (2) *Compressed Tablets* are composed of compressed powdered

drugs often in considerable doses. They are the most unreliable and often fail to dissolve. (3) *Coated Tablets* are compressed tablets coated with chocolate, sugar, gelatin, keratin, etc. (4) *Hypodermic Tablets*—These are readily and completely soluble tablets usually of triturates of powerful substances, designed for subcutaneous injection. Except the last named, tablets have never been popular with Eclectic physicians.

Tinctures (*Tincturæ*) are alcoholic solutions of non-volatile vegetable (and sometimes mineral) substances. They are prepared by maceration or percolation, generally the latter. Tincture of iodine and tincture of ferric chloride are alcoholic solutions of chemicals. Tinctures are practically identical in nature with fluidextracts, though their *degree of strength* is much lower than that of the latter. Tinctures of potent drugs are of 10 per cent strength. Others usually of 20 per cent or more. Tinctures are extensively used. Like fluidextracts they contain their relative proportion of plant-dirt and other colored impurities. Tinctures made from fresh bruised or crushed herbs, by maceration, are known as *Tincturæ Herbarum Recentium* or *Tinctures of Fresh Herbs*. Tinctures are also (1) *simple*, and (2) *compound*. Examples: (1) Tinctura Digitalis; (2) Tinctura Gentianæ Composita.

Tincturæ Homœpathicæ (*Homœopathic Mother Tinctures*) are prepared in four classes:

(1) by expressing the juice from freshly-gathered plants or parts thereof, chopped and pounded to a pulp, and enclosed in new linen and expressed, and mixing the juice so obtained and briskly agitating with an equal bulk of alcohol, allowing it to stand eight days in a dark, cool place, and finally filtering the product. The amount of drug power is one-half.

(2) by mixing two parts of alcohol with three parts of the comminuted plant, straining the liquid through new muslin, and proceeding further as above directed. The amount of drug power is one-half:

(3) by taking two parts of alcohol to one part of the comminuted plant and macerating them together for eight days in a well-filled bottle, and lastly, decanting, straining, and filtering. The amount of drug power is one-sixth.

(4) by taking alcohol, five parts, to the comminuted drug (vegetable or animal), one part, macerating eight days, shaking twice daily, and lastly, decanting, straining, and filtering the product. The amount of drug power is one-tenth.

Triturations (*Triturationes* or *Triturates*) are made by triturating (rubbing) a medicinal substance with sugar of milk, the latter being employed simply as a diluent. Triturations containing one part in ten are denominated *first decimal triturations* (1x); one part of the foregoing with nine parts of milk sugar, *second decimal* (2x), and so on. Examples: (1) Trituratio Podophylli; (2) Trituratio Santonini 2x.

Vinegars (*Aceta*) are filtered solutions of the active constituents of drugs in diluted acetic acid. As many alkaloidal principles are best dissolved in this menstruum, these preparations (of certain drugs, as lobelia, sanguinaria, etc.) are very excellent medicines. Vinegar was formerly, and to some extent is still, used in many excellent Eclectic aceta. Examples: Acetum Scillæ; Acetum Lobeliæ,

Wines (*Vina*) or **Medicated Wines** (*Vina medicata*) are fluid preparations, in which the soluble medicinal principles are dissolved in or extracted with wine. They are in reality weak vinous tinctures, and are fast being discarded. Example: Vinum Colchici Seminis.

IV. ACTION AND EFFECTS OF MEDICINES.

THE GENERAL NATURE OF DRUG ACTION.

The student and the doctor are eternally seeking the "reason why". How do medicines act? they ask; what is the nature of pharmacological action? This can only be answered at the present time by saying that we do not know definitely; that while many theories have been advanced, they have been found wholly or in part untenable, no definite conclusion as to how drugs act having as yet been satisfactorily reached. Theories have included chiefly the *Physical*, including protective and salt action; and *Chemical*, comprising also "electrolytic dissociation", and others. The chemic theory has been that most largely accepted, but within a few years the physical has gained much ground. While most of the theories propounded have not been satisfactorily proved, neither have they been conclusively disproved. The probabilities are that drugs act both physically and chemically.

Sollmann (*Text-Book of Pharmacology*) flatly declares that "pharmacologic action must be conceived as purely chemic" and that substances often produce the same changes in living as in dead protoplasm ("H_2SO_4 and other caustics"); while others change mainly or solely the living molecule ("extremely active muscle and nerve poisons, as most alkaloids and glucosids").

Butler (*A Textbook of Materia Medica, Therapeutics and Pharmacology*) says: "The action of drugs is fundamentally a question of protoplasmic chemistry, but the investigations of the biologists have not yet reduced the interpretations of nature to a question of molecular physics."

Among some of the theories of general drug action may be mentioned the following: (1) Mutual rearrangements of molecules of the drug and those of protoplasm; (2) Some drugs act upon tissues, probably altering their chemical characters, yet are themselves unchanged; (3) "electrolytic dissociation," an electro-chemic reaction in which not the molecules but the *ions* of the salt and those of the protoplasm exchange places; (4) salt action, a physical osmotic process in which a changed relation of fluid to cells takes place, etc. While none of these theories fully explain the nature of the action of drugs, except in limited or special fields, it is probably true that each plays some part in the sum total of activities in this as yet unexplained question of the action of drugs upon living organic tissue.

Without question the protoplasmic cell is the part of the body primarily acted upon. In very recent years there has been a strong leaning toward the physical theory of the action of drugs, especially in accounting for changes shown as the result of penetration or non-penetration of the cell walls, leading to alterations or rearrangements of the contents of the cell, or to the change of surface tension altering the relationship of the cell membrane to its enveloping fluids. On the other hand some maintain the chief action takes place in the intra-cellular membranes—and several other theories have reference to electrical conductivity and other alterations in the cells and their contents.

While much has thus been written to prove certain physical and chemical changes occurring through the exhibition of drugs, none of them explains the whole process of pharmacologic action. Cushny (*Pharmacology and Therapeutics*) wisely concludes: "From the present confusion the only legitimate conclusion seems to be that the activity of drugs depends on a large variety of factors and that pharmacological action cannot be brought under any one law, either chemical or physical."

EFFECTS OF DRUG ACTION.

While the manner of action of drugs has not been settled, the assumptions and results as stated by pharmacologists are as follows: In the present state of knowledge drugs are believed to act upon the cells of living matter in some way, whether chemic, physical, or otherwise, altering their activity. The effects of such action are *stimulation*, *depression*, *irritation*, *paralysis*, and *death*. When a drug increases the functional activity of a part it is assumed that it does so by *stimulating* it. Reversely when it decreases functional activity it does so by *depressing* it. When an alteration in the cell

is produced, irritating, inflaming, or altering its growth or nutrition, it is brought about by *irritation*. Stimulation carried to excess, either as to force or time, results in over-stimulation, which then lapses into *depression* and finally *paralysis*. Paralysis is impairment and sometimes death of function, and may even end in death of the vital organs. Continued irritation leads to *death* of structure.

Drugs, then, *excite*, *depress*, *irritate*, *paralyze*, and *kill*. The effects of their action are upon function or structure, or both. No new function is ever created by a drug. According to Cushny, stimulation is said to take place chiefly in, or at least is most observable in, the higher functionating or more specialized cells of the nervous system, the heart, and the glands of secretion; irritation, while it may be met in all living tissues, is best noted in the action of drugs upon the cell-contents of the connective and epithelial tissues.

SELECTIVE DRUG AFFINITY.

There is no medicine known to act upon *all* the tissues of the body, but when one acts detrimentally to a wide area of cells it is called a *protoplasmic poison*. There are a number of such agents, of which quinine and mercury may be mentioned. Some few are said to have a specific or highly selective action, as when they attack parasites infesting the blood cells and destroy them and accomplish this destruction in doses which do not harm the host. These drugs, however, carried to excess become poisons to the host. Quinine again may be cited, as it destroys the *plasmodium of malaria* in the blood. Probably arsenic and mercury have a similar action upon the *treponema of syphilis* and other spirillæ, and possibly the salicylates directly attack and cripple or destroy the micro-organism of acute rheumatism. The latter, however, in the very large doses often administered, are very apt to injure the host and do so unless used in a very circumspect manner. These are among the so-called *specifics for diseases* now admitted in regular medicine and, while they are in a sense specific medication, they are not to be confused with Eclectic Specific Medication (which see).

Medicines are said to have a *direct* action when their effects come through contact with the tissues; *indirect* when a secondary result is the reflection of a direct or primary action. Medicines act *locally* when the effect takes place at the point of contact; they are called *systemic* or *general remedies* when they are absorbed into the blood and carried by that current to their selected field of action.

Medicines have a selective affinity for the cells of certain tissues or parts of the body. They may act upon one or more organs, or merely upon a specialized part of them. One remedy may select the heart (digitalis); another the blood vessels (nitrites), some act upon the medullary centers (belladonna), others on the peripheral nerves (aconite). Some select and control the secretory glands, increasing their function (pilocarpine)—while still others act oppositely upon the same structures, depressing activity (atropine). The renal cells are directly acted upon by some drugs (theobromine); a few attack the hepatic cells (podophyllin); others the unstriped muscular fibres (ergot), and still others the cells of

the cerebral cortex (bromides), and the higher cerebral tissues (cannabis). This selective affinity of drugs is one of their most characteristic qualities, and it must be remembered that to this phenomenon alone must we look to do good instead of harm with medicines. The action of the great majority of medicines, however, as before stated, is unknown, though the structure or function feeling its effects may be determined. Until the action of drugs is better understood physicians will treat patients empirically and symptomatically, and Eclectics especially by the present method of specific medication—all using the least amount of a drug that will produce beneficial results without harmful collateral or after-effects.

ABSORBABILITY OF MEDICINES.

Medicines, to be systemically effective, must be soluble in some absorbable menstruum, or be capable of solution in some of the fluids of the body. Invariably drugs are most readily absorbed when in solution. Alcoholic solutions are more easily taken up than aqueous solutions, and for this reason would be preferable to the latter were it not for the twofold reason that they may have an undesired effect of alcohol itself and that they tend to initiate a pernicious habit. Elixirs, though pleasant and preservative as vehicles, are open to the same objections, especially when administered to children and youth. Water, being innocuous and absorbable, is almost always employed as the vehicle for the administration of the specific medicines. Water-borne medicines are readily absorbed, and, with rare exceptions, no change is induced in the medicines so administered. No habit is created; none fostered.

Insoluble medicines, except for local effect and as protectives, are not desirable forms of administration unless they can be dissolved by the gastric or intestinal juices. Sometimes it is intended that a medicine shall not act until it reaches the intestinal canal; then one insoluble in the stomach may be given. If it is a medicine likely to be changed or destroyed by the gastric contents, or if it is intended to be protected from the salivary and gastric secretions, and made to dissolve in or be dissociated by the alkaline juices of the intestines, it may be encased in some such substance as keratin, which is not dissolved in the stomach, but disintegrates at once when in contact with the alkaline media of the intestinal and associate secretions. The administration of hard and difficultly soluble medicines is to be avoided because of their slow and uncertain rate of disintegration and absorption, and their consequent unreliability. Old and hardened pills, with a practically insoluble coating due to ageing, and notably certain compressed tablets, may pass completely through the intestinal tract without solution or effect. Syrups and mucilages are useful where a prolonged contact with the tissues is intended, provided they do not lessen the efficiency of the medicinal ingredients. The syrups are valued chiefly for their agreeable taste. The sick individual, however, generally has little appetite for things enjoyed in health, and the stomach often rebels against sweetened and aromatized medicines. Especially is this true in acute illness. Neither should sugar be administered to those suffering from sugar intolerance, glycosuria, or diabetes mellitus. It follows then that, all things considered, the Eclectic physician, in using the

majority of medicines prescribed by specific medication methods, has come to regard water as the most useful, pleasant, and efficient vehicle for the administration of medicines, as well as the most readily absorbable, without interference with the action desired, or the integrity of the medicinal ingredients (see also *The Dispensing of Medicines*).

Bearing in mind that systemic medicines can act only when absorbed by the blood or lymphatics, it follows that, to obtain the promptest results, conditions must be right for their absorption. Drugs, when administered by mouth, act most readily when the stomach is empty; and tardily, sometimes not at all, when diluted by the contents of the stomach. A full stomach may absolutely prevent absorption, or the medicine may be destroyed by the material present. Nevertheless most medicines, while undoubtedly some of them and their effects are lost, are necessarily given at short intervals, and in spite of stomachic conditions the general consensus of opinion is in favor, as has long been advocated in Eclectic therapy, of administering medicines in small and oft-repeated doses.

Medicines probably act best when the circulation is active and slowest when depressed; they also act quicker when the stomach is irritated, and in atonic conditions of both the gastric and intestinal tracts when local stimulants, such as capsicum, are given with them. When diarrhœa is present or vomiting occurs while medicines are being administered, naturally less absorption is taking place and a portion of them is being lost through hasty elimination. Local medicines (with a few exceptions) are not absorbed but act solely by contact with the tissues or their secretions or excretions.

ADMINISTRATION AND RATE OF ABSORPTION AND ELIMINATION.

Drugs which act promptly and are generally quickly absorbed and rapidly eliminated are given at short intervals. Thus fractional doses of aconite, belladonna, gelsemium, or rhus may be repeated every half hour, hour, or two hours. Full amounts of these drugs are completely eliminated in a few hours, hence fractional doses at short intervals are not cumulative. If aconite, in poisonous doses, does not kill in three hours, the patient is likely to recover, so rapid is its elimination. By repeating the small doses of actively absorbed and readily eliminated drugs a continuous and kindly therapeutic action is maintained, and no over-activity or cumulation occurs. Such a drug as digitalis, however, which is slowly absorbed and more slowly excreted, should be administered at long intervals lest overlapping of doses and alarming cumulative effects be produced. It is quite the custom when giving foxglove for long periods to stop its administration for one or two days out of a week, and for the rest of the period administering but one full dose a day. A single dose produces its effects for many hours. It is evident, therefore, that no absolute rule of dosage can be given for medicines, and that a study of each individual drug, noting its rate of absorption and excretion, should be made by the student in considering all active and powerful drugs. This will guide as nearly as possible to the frequency with which a drug should be administered. It must be noted also that the duration of the action of drugs, while depending most largely upon their rapidity of absorption and their

rate of destruction within the body tissues or their complete or partial elimination, may depend to some extent upon the integrity of the anatomic structures and their capability of physiologic functioning. In some instances drugs cannot be eliminated because the organs of excretion are crippled, or actually destroyed, or functional powers so impaired that excretion either is effected very slowly and imperfectly or cannot take place at all. When pathological conditions of such a character are known one must be exceedingly cautious in the exhibition of powerful medicines.

CIRCUMSTANCES MODIFYING DRUG EFFECTS.

While in the main the effects of drugs generally are much the same on most individuals, there are conditions or circumstances which tend to modify their action. Among these are usually noted the (1) age, (2) sex, (3) race, (4) weight, and (5) temperament; and the presence of (6) variations of temperature, (7) diseased tissues, (8) drug habit, (9) pregnancy (and sometimes menstruation), and (10) idiosyncrasy. The preparations of medicines employed and their doses, and time and manner of administration also figure largely in the results obtainable from medicines. During pregnancy harsh cathartics should be avoided lest through increasing pelvic congestion they may favor abortion.

(*a*) **Cumulative Action.**—When a drug has been administered for a considerable time with but ordinary results and then suddenly produces a violent, unexpected, or alarming effect, it is said to have cumulated; and the action is termed *cumulative*. This phenomenon may be caused by slow or irregular absorption after accumulation of a considerable amount of the drug in the intestinal canal; to greatly overlapping doses; to absorption taking place faster than the drug is excreted; or, as some have suggested, to a process induced by which excretion of the drug is prevented by its own action upon the eliminating organ, as of the kidney. A notable cumulative drug is digitalis; arsenic and mercury are others, the so-called chronic poisoning by metallic medicines being due to cumulation in the tissues. Apocynum may be given with no other effect than to strengthen the heart's action and reduce dropsical effusion, when, after several weeks' use, it will suddenly induce a prostrating diarrhœa.

(*b*) **Drug Tolerance.**—Certain medicines, which at first produce only intended and expected effects and can be used up to certain limits with safety, subsequently may be given in increasingly larger amounts, usually without danger to life, but not without undesirable results. A drug habit or state of acquired tolerance is thus established, examples of which are the tobacco, opium, arsenic and cocaine habits, and to a lesser extent, alcoholic addiction. Just how this takes place is not well understood. While, in a measure, it may be due to diminished or irregular absorption with increased elimination by the bowels, or to destruction of a greater amount of the drug or its more rapid excretion by the tissues preventing concentration, it is thought to be largely due to some change in the body tissues making them more resistant to the action of the drug. Sometimes this action appears to be limited to certain parts of the body, which at first responding normally to the drug, finally become tolerant of its presence,

as is seen in acquired tolerance of some vital organ, as the brain or heart, or as takes place in some of the organs of special sense, and in all of which permanent damage results.

(*c*) **Idiosyncrasy** is the peculiar susceptibility (sometimes insusceptibility) of the tissues of certain persons to the influence of certain drugs. Some individuals cannot take quinine without experiencing a severe attack of urticaria, and ipecac will excite in others a violent asthmatic seizure. Probably a failure to prescribe according to specific indications, with a resultant untoward effect, is often mistakenly attributed to idiosyncrasy and undoubtedly some cases of so-called idiosyncrasy to protein substances are probably examples of anaphylaxis. In the present state of scientific knowledge no real cause for idiosyncrasy has been satisfactorily determined.

(*d*) **Synergists and Antagonists.**—When a drug by its very presence increases the efficiency of another, both as to rendering the latter safer and in assisting a lesser quantity of either to produce desired effects, it is said to act as a *synergist.* There are many such drugs, and most of them have been used as adjuvants in combinations designed to act upon the intestinal tract; some on the nervous system. A combination of cathartics is often used because it acts more thoroughly than a single agent. A commonly cited association is that of chloral and morphine, which, when combined, requires a lesser amount than of either when given alone, and acts with equal efficiency. Other agents act synergistically by correcting obstructive conditions, as when the nitrites relax vascular tension so that digitalis may act more safely and effectively.

When medicines prevent or lessen the effects of another they are said to be *antagonists*, and such an instance is often cited in the failure of strychnine to act when the body is fully under the anæsthetic influence of chloroform.

DOSAGE.

Exactitude in dosage, were this accurately determined for various conditions, would unquestionably greatly aid in medication. As a rule, doses usually administered are far in excess of necessity, and it is better to err on the side of insufficient dosage and trust to nature, than to overdose to the present or future harm or danger of the patient. With potent drugs especially should the greatest care be had to give the smallest possible quantities that will achieve results, and never to give them without a well-defined indication. With non-potent drugs the danger of damage is diminished, and even those should be used only when indicated. No medication is better than aimless medication. These have been fixed rules in the practice of specific medication. It must not be understood that by non-potent medicines is meant that such drugs have no therapeutic power or value. It remains a clinical fact that many drugs of supposedly non-potent character, when given in minute doses, best influence conditions of disease, even though no explanation of the action can be given. The fractional dose of matricaria or of pulsatilla effects a positive control over nervous phenomena that cannot be duplicated by the more powerful agents or doses.

Unless otherwise stated, the *doses of preparations* named in this work are those for *adults*. The age limit governs, in some degree, the quantity

of a drug to be given at a single dose and the daily amount. The very young obviously should not be plied with vicious doses of potent drugs, and in those past three-score the body conditions are relatively like those of infancy and childhood; hence care should be exercised lest they be over-drugged. In the aged, perhaps, the most usual exception will be in the use of cathartics, and sometimes of diuretics. As a rule, large and robust persons require fuller doses than small and frail individuals; women less than men; and children much less than adults, and in amounts graduated according to age and weight. These strictures apply to drugs given for the *gross effects*, and less to those administered in small doses according to the practice of specific medication (see *Dosage of Specific Medication*). Even in the latter, only the smaller and graduated doses should be administered to children and infants.

In the medication of children certain rules of dosage have been followed by some prescribers. These rules apply only to gross doses, and not to the fractional doses of specific medication methods. While no absolute law can be laid down in administering medicines to children, one or the other of the following rules is that most favored:

1. Young's Rule: In which the dose is computed by dividing the child's age by 12 plus the age. Thus, for a child of 4 years $\frac{4}{12+4}=\frac{4}{16}=\frac{1}{4}$; therefore, the dose should be one-fourth that which would be given to an adult.

2. Cowling's Rule: In which the year number of the next birthday is divided by 24. Thus, for a child coming 3 years of age: $3/24=1/8$; hence the dose should be one-eighth that of the dose for an adult.

Obviously no exact rule can be established, and these doses should be curtailed in some instances, notably in the administration of narcotics and intensely poisonous drugs, while in the use of cathartics the doses may have to be increased. Beginning at 60 years of age, dosage by systemic remedies should run a gradually descending scale, while it may be necessary to greatly increase that of eliminants, as cathartics and diuretics. It must be remembered that opium and its derivatives are especially dangerous to children and tend to invite pulmonary œdema in the aged.

For rectal administration, *larger* doses are required than by mouth; usually from one-fourth to one-half larger.

For hypodermatic use the dose is usually from one-third to one-half *less* than by mouth. As most drugs so administered are very powerful, the initial dose should be as small as possible unless the patient's susceptibility or tolerance be known; and even then only much smaller doses of powerful poisons or narcotics should be permitted. Very innocent vegetable drugs taken by mouth may become harmful when hypodermatically used.

DOSAGE OF SPECIFIC MEDICINES.

The doses given under each individual drug are those found to be within the range of the *maximum* and *minimum amounts for most adults*. The determination of dosage for gross effects is, to a large degree, a personal matter with the prescriber and depends very largely upon his individual experience and his skill in determining the needs of the patient. In specific medication the relationship between medicine and dosage is based usually upon the smallest quantity of drug which will meet a specific indication,

learned through experience in a large number of similar conditions, and which will act kindly and produce the desired effect without shock or damage to function or structure. For most of the medicines it has not been thought that dosage amounted to so much as selection for the specific adaptability of the drug to the disease-condition. It has been determined that very small doses are effective when directly indicated, and this accounts for the apparent smallness of the dose usually administered specifically as compared with the range of dosage indicated as possible under the drug considered. For most of the very active drugs, as aconite, the dose is the small fraction of a drop, from 1 to 5 drops (rarely 10) of the specific medicine being added to 4 fluid ounces of water, and of the mixture so prepared a teaspoonful being administered frequently. Of less powerful agents, as gelsemium, the larger proportion of 5 to 30 (sometimes 60) drops may be added to the menstruum; while belladonna and others of the more powerful of the Solanaceæ give a decidedly wide range of effects from different sized doses, ranging from the smaller fractions to the full accredited dose of the drugs.

SALT ACTION.

An important action of drugs is that known as *salt action*, in which salts (also acids, alkalies, sugars, and some other substances) act upon the principle of osmosis—that when two solutions of different density separated by a membrane through penetration of that membrane come into contact with each other, they tend to equalize in concentration. In the living tissues this takes place with the cells acting as the dialyzer and is more varied in its reaction to different substances than the action through a dead membrane. Most cells are permeable in differing degrees by water and certain salts; some substances do not penetrate or the cells are not penetrable at least to any great degree. The chief object attained by salt action is the change of watery contents that takes place within the cell, and in this way a therapeutic effect is obtained. Some instances of increased diuresis are thought to take place in this manner, and the well-known effects of salts (saline laxatives) in inducing watery catharsis is explained upon the theory of "salt action".

V. APPLICATION AND ADMINISTRATION OF MEDICINES.

Medicines are applied or administered chiefly to the skin and to and by way of the mucous surfaces; by way of the subcutaneous areolar tissues; by intracutaneous injection; by intramuscular injection; by intravenous injection; by intraspinal puncture; by intraperitoneal injection; and occasionally to serous tissues, wounds, ulcers, etc.

I. To the Skin, or External Integument

There are three general (and one special—Schleich's) methods of applying remedies to the skin: (1) a, *enepidermatic;* b, *epidermatic;* and c, *endermatic;* (2) *intracutaneous.*

(*a*) By the *enepidermatic method* the medicine is applied to the skin *without friction*. *Examples:* Baths, fomentations, sinapisms, poultices, blisters, etc.

(*b*) By the *epidermatic method* the medicine is applied to the skin *with friction*. *Examples:* Ointments, liniments, etc.

When used by inunction, a site for easy absorption by reason of thinness of skin and abundant lymphatic circulation should be selected; usually the axillæ, groin, and inner aspect of the thigh. This is a favorite method in Eclectic practice of administering quinine to children, or when the stomach will not tolerate it, and by those of other schools for the use of mercury in syphilis.

(*c*) By the *endermatic method* the medicine is brought in direct contact with the denuded derma, the epidermis having been first removed by means of a blister, cantharides or ammonia generally being employed. The medicine subsequently sprinkled upon the raw surface is quickly absorbed. This method is a relic of therapeutic barbarism, and has been practically abandoned. *Examples:* Morphine, quinine, etc.

(2) By the *Intracutaneous method* a drug-laden solution is injected directly *into* and between the layers, but not through the skin, as when cocaine is used as a local anæsthetic to prepare the part for incision.

II. To or By Way of the Mucous Surfaces or Internal Integument.

(*a*) To the *Nasal* or *Pituitary Membranes*, by means of *insufflations*, *douches*, and *atomization*.

(*b*) To the *Conjunctivæ*, chiefly by *insufflation* or *instillation* for purposes of (*a*) controlling local and deeper ocular inflammation; (*b*) for protection; (*c*) to relieve pain; and (*d*) for mydriatic, myotic, and cycloplegic effects.

(*c*) To the *Naso-tracheo-bronchial Membranes*, by *insufflation*, *inhalation*, and *atomization*. It is a question whether by ordinary atomization medicines reach the alveoli of the lungs, but by means of nebulizing outfits even the uttermost part of the breathing organs may be treated.

(*d*) To the *Gastro-intestinal Membranes*, by *ingestion*. *Examples:* Powders, pills, tablets, triturations, mixtures, extracts (solid and fluid), infusions, decoctions, vinegars, wines, specific medicines, tinctures, solutions, lozenges, etc.

Medicines are administered by mouth for (*a*) local effect upon the tissues over which and to which they pass; and (*b*) for absorption by the lymphatics and blood for distribution to the parts intended. When a local effect upon the mucosa of the stomach is desired they should be given before meals; when upon the intestines from two to four hours after partaking of food, especially if ulcer is present. When an irritant effect is to be avoided or when slow absorption is intended they should be administered immediately after a meal. Iodides are far less apt to produce "iodide punishment" if given in this manner. Unless an irritant action is wanted, or very rapid absorption, medicines are generally given after partaking of food. *Eclectic Specific Medicines* for specific medication purposes are usually administered in small doses frequently repeated for continuous effect.

(*e*) To the *Recto-colic Membranes*. Medicines are applied to these parts both in solid and liquid form: (1) *solid*, suppositories and ointments. Suppositories are employed (*a*) for slow absorption of medicines; (*b*) to provoke fecal expulsion; ointments (*a*) for slow absorption; (*b*) for protection. (2) *fluid*, enemas, lavements or clysters, and by enteroclysis.

Enemas are employed to remove fecal accumulations and flatus. *Enteroclysis*—a slowly injected enema, usually of normal salt solution—is resorted to (*a*) to wash out the bowel; (*b*) to dilute poisonous material; (*c*) to inhibit bacterial infection; (*d*) to keep up body heat; (*e*) to prevent anuria; (*f*) to remove impacted feces; and (*g*) to reinforce body fluid after exhaustive waste. It is often used after operations to overcome tendency to or revive from shock, and supply fluid, and to prevent failure of the renal function. It should be used, preferably, by means of a fountain syringe, placed at desired height, and without force, the fluid being allowed to merely trickle into the bowel. A large quantity should be employed, the proper temperature being from 101° to 103° F, lest chilling and possibly death result from a lower degree, or heat-stroke follow a higher degree of heat.

(*f*) To the *Urino-genital Membranes*, by means of *bougies*, *medicated ointments*, and *injections*.

(*g*) To the *Utero-vaginal Membranes*, by means of *ointments*, *suppositories*, *tampons*, and *injections* (douches).

III. By Way of the Subcutaneous Areolar Tissues.

Medicines to take effect quickly are applied to these parts hypodermatically, *i. e.*, by the injection of small quantities of solutions by means of the *hypodermatic syringe*, and in larger amounts by employing a fountain syringe with larger canula by the process of *hypodermoclysis*.

The advantages of hypodermatic medication are (*a*) rapid absorption; and (*b*) no loss of medicinal dose provided the drug be completely dissolved. The disadvantages are (*a*) pain; (*b*) danger of entering a vein and producing a too rapid effect; (*c*) abscess, if

carelessly performed; and (*d*) rarely, air embolism. The latter may be avoided by expelling the air from the barrel of the syringe, which may be known by the drops of fluid emerging from the point of the needle.

Absolute cleanliness both as to instrument and site, both being sterilized, must be observed in hypodermatic medication. The best sites for ready entrance and absorbability are the arm, the forearm, buttock, belly wall, and calf of leg; sometimes the back of the body. A spot as free from veins as possible should be selected, pinching the skin to a fold to prevent pain and provide easy penetration, and the injection made between the fingers and the surface. The needle should enter the areolar tissue and not between the layers of the skin.

Hypodermoclysis is resorted to when we wish (*a*) to replace lost fluid, as in hemorrhage, cholera, etc.; (*b*) to increase elimination of impurities by way of the blood and lymph channels; (*c*) to flush out the kidneys; (*d*) to increase diuresis in some cases of uræmia; and (*e*) to supply fluids to the body when vomiting is persistent. Sterile normal salt solution is employed by means of a sterile apparatus, with hose and canula, the latter being plunged into the subcutaneous areolar tissue, preferably of the chest or abdomen, and the injection allowed to proceed slowly. Absorption takes place rapidly. The rule (Hare) is not to exceed one drachm of fluid to each pound of body-weight in fifteen minutes.

IV. By Intravenous Injection.

By means of *transfusion* and by the *injection* of medicinal substances directly into the veins. Ordinarily this is too dangerous a method except for those thoroughly equipped and trained for this purpose. The average practitioner, unless so prepared, should not attempt it. It has rapidly come into renewed use since the introduction of medicines for the treatment of syphilis and similar constitutional diseases.

V. To the Muscular Tissues.

By *intramuscular injection* deeply into the belly of the muscle. Absorption takes place rapidly. Painful indurations are common and abscesses may result from this method of employing medicines. *Examples:* Mercury; Arsphenamine.

VI. By Intraspinal Puncture.

By the *intraspinal method*, as when stovaine, or solution of magnesium sulphate, or certain serums, are introduced into the spinal canal by means of lumbar puncture.

VII. By Intraperitoneal Injection.

By the *intraperitoneal method*, as when solutions of glucose or of salt are introduced through the belly-wall into the peritoneal cavity.

VI. INCOMPATIBILITY.

Incompatibility is a subject of wide and almost endless consideration. For general purposes, however, a few only of the incompatibles need be considered. Incompatibility is a state in which, two or more substances being brought together in a preparation, undesired changes are effected, viz.: (1) *Chemical*, by decomposition, precipitation, or by the formation of new, or poisonous, or dangerously explosive compounds; (2) *Pharmaceutical*, by the formation of imperfect or unsightly preparations (which, however, are not necessarily altered in activity), through immiscibility, incomplete solution, or gelatinous or other turbidity; (3) *Therapeutic*, by mixing drugs having an antagonistic action within the body.

Incompatibility in preparations may be avoided best by simplicity in prescribing, using but one medicament to the proper solvent. The doctor should have some general knowledge of chemistry, particularly of the solubility, insolubility, and reactions of chemicals. In this way he may cut to the minimum the instances of chemical incompatibility. The responsibility for pharmaceutical incompatibility, except where the physician dispenses, rests with the pharmacist. Physicians as a rule are not expected

to possess a wide knowledge of pharmacy and pharmaceutical manipulation. Therapeutic incompatibility rests entirely upon the physician, for if he prescribes antagonistic agents in a single preparation he, and not the pharmacist, makes the error. The pharmacist, however, may check him up and inform him, to his benefit, of his mistake.

The Eclectic physician who follows specific medication is less likely to have incompatibles to contend with, as the amounts of alcoholic or resinous or other precipitable material added to water, the usual menstruum, is negligible and easily kept in suspension. Only when he departs from the rule of single medicines may he occasionally have to contend with therapeutic incompatibility, as when he mixes aconite and digitalis in the same mixture. As the physician occasionally has need of other than specific medication we have listed below some of the commonest and more important of incompatibles.

Substances.	Incompatibles.
Acacia (Gum Arabic).	Stronger alcoholic solutions; sodium biborate (borax); iron salts; mineral acids; lead water.
Acid Salts (Vegetable).	Are changed by mineral acids; decomposed by alkalies.
Acid, Salicylic.	Alkalies; alkaloids; iron salts (turn purple); carbolic acid (purple).
Acid, Tannic.	All alkaloids; iron salts (form inks); gelatin; chlorates and other oxidizers (explode).
Acids, Mineral.	Alkalies; carbonates; bicarbonates; hydrates; oxides; halogen salts (bromides, chlorides, and iodides). Strong acids decompose acid salts. Strong acids set free relatively weaker acids (usually organic). Strong acids form ethers with alcohol or alcoholic solutions; fluidextract of licorice (precipitates glycyrrhizin); mucilages.
Acids, Organic.	Decomposed by strong mineral acids.
Alkalies (including alkaline carbonates, acid carbonates, hydrates, lime water and ammonia water).	All acids (mineral or organic—neutralize); or relatively weak salts; all alkaloids precipitate but sometimes redissolve in excess of precipitant, or if sufficient alcohol be present; some glucosides (decompose); and fixed oils and fats (saponify).
Alkaloids.	All alkalies; tannin or tannin-bearing solutions; iodine and iodides; salicylates; mercuric chloride or corrosive sublimate; chlorinous preparations. Alkaloids also precipitate each other. Alkaline salts, *e. g.* Na H CO_3 are precipitants.
Antipyrine.	Spirit of nitrous ether (sweet spirit of nitre) (forms poisonous compound); free iodine; calomel; preparations of cinchona; metallic salts.
Arsenic Compounds (Fowler's solution; Scheele's green; Paris green; Arsenous acid).	Tannin; iron salts, especially the freshly precipitated hydroxide; magnesia; lime.
Bismuth.	Mercurous chloride (calomel); tannin; sulphur.
Bitter Infusions (except of calumba, gentian and quassia, which do not contain tannin).	Salts of iron and of lead.
Bromides.	Acids; alkalies; acid salts; alkaloids; especially morphine.
Chloral, Hydrated.	Alkalies; camphor or menthol (cause liquefaction); potassium bromide; acid salts; cyanide of potassium (sets free prussic [hydrocyanic] acid).
Chlorides.	Silver and lead salts; alkalies; hydrogen peroxide.
Chlorates.	Explode when *triturated* with any substances that will burn (sugars, tannin, sulphur, powdered vegetable drugs); changes mercur*ous* to mercur*ic* salts.

Substances.	Incompatibles.
Chloroform (except in minute quantity).	With water.
Cocaine.	Borax (but not boric acid) with which it forms an insoluble borate.
Corrosive Sublimate (Mercur*ic* chloride).	Almost universally incompatible, especially with alkaloids and vegetable astringents; (exception: alkaline chlorides and some chlorides of the metals); iodide of potassium, unless solution of double salt is desired.
Calomel. (Mercur*ous* chloride).	Alkalies; iodides; antipyrine; chlorates and chlorides; salts of iron or of lead.
Camphor (Spirit of).	With water (precipitates).
Carbonates and Bicarbonates.	With acids and acid salts.
Digitalis.	Iron salts; tannin-bearing preparations.
Emulsions.	With alcoholic solutions (precipitate).
Fluidextracts.	Most of them precipitate with water.
Glucosides.	Tannin; strong acids (decompose); some alkalies (decompose).
Hydrogen Dioxide.	Decomposes readily in solution; loses value with alkalies.
Iodine and Iodides.	All alkaloids; starch; salts of the metals; strong acids; spirit of nitrous ether; turpentine; iodine mixed with ammonia water explodes upon evaporating.
Iron Salts. (Ferric and Ferrous; Tincture of Iron Chloride).	Tannin (forms inks); alkalies; mucilages; arsenious acid (arsenic trioxide) and its salts; all vegetable drug solutions or preparations, excepting calumba, gentian, and quassia, which contain no tannin.
Lead Salts.	All alkalies (precipitate); all acid radicals except of acetate or nitrate, the only two soluble lead salts.
Magnesia.	Acid radicals (precipitate) with soluble compounds of magnesium, except citrate and sulphate; arsenic preparations.
Mercur*ic* Salts.	All alkaloids and alkalies; albumens or preparations containing albuminous material.
Mucilages.	Acids; iron salts; alcohol.
Pancreatin.	Acids.
Pepsin.	Alcohol; alkalies; tannin.
Potassium Chlorate.	Explosive [see page 45]: with organic or oxidizable substances; decomposes iodides and calomel.
Potassium Iodide.	All strong acids and acid salts (see Corrosive Sublimate).
Potassium Permanganate.	See page 45: Explosive with deoxidizers; alkaloids.
Resin-bearing Solutions.	Water (precipitate).
Silver Nitrate.	All substances except nitrates and nitric acid.
Spirit of Nitrous Ether. (Sweet Spirit of Nitre).	Antipyrine (forms poisonous compound); strong acids; iodides of alkalies; mucilage of acacia, unless largely diluted; iron sulphate; tincture of guaiac; most carbonates.
Tinctures (1) and all strong alcoholic menstrua; (2) If containing alcohol. (3) If containing oils (fixed) and fats.	(1) Acacia; aqueous solutions. (2) Tannin; iodine and iodides; alkalies. (3) Iron salts. Alkalies (form soaps).
Oils, Essential.	Water (precipitates) unless not more than one minim of oil to one ounce of water.
Vegetable Tannin-holding preparations.	Salts of iron or of lead.
Morphine.	Bromides (precipitates on standing).
Strychnine.	Bromides (precipitates on standing).

Dangerous Explosive Mixtures.

Oxidizers and Deoxidizers when triturated together.

Do not mix any of the following together *with trituration*, as a dangerous explosion may result:

Permanganate of Potassium Chlorate of Potassium Chromic Acid (Chromium trioxide) Picric Acid Bromates Iodates Concentrated Nitric Acid Nitrates Strong Hydrochloric Acid Nitro-Hydrochloric Acid	with	Easily oxidizable material (*anything that will burn*), such as all Organic substances: Sugar, Powdered Drugs, Starch, Glycerin; Alcohols; Ethers; Tannin. Iodine and Iodides; Reduced Iron; Phosphorus, Phosphites, and Hypophosphites; Sulphur, Sulphides, Sulphites, and Hyposulphites.

Do not mix Iodine with Ammonia (explosive upon evaporation) or with Turpentine (inflammable).

Keep Phosphorus under water lest it become spontaneously inflammable.

The Following Agents should be given without admixture with other drugs: Antipyrine, in capsule or powder, or with water or alcohol.

Acetanilid, in capsule or powder, or with water or alcohol.

Silver Nitrate in pill made with clay, talc, vaseline or cacao-butter, and enclosed in capsule. For external use dispense in aqueous solution in bottle of blue or brown glass to exclude actinic rays. Solutions of organic silver salts—Argyrol, Protargol, Silvol—should be similarly dispensed.

Corrosive Sublimate should be given alone, as it is changed by or changes most other salts.

Acids (unless greatly diluted), alkalies, alkaloidal salts, Antimony and Potassium Tartrate and Calomel should be given alone. Sometimes Bicarbonate of Soda is given in tablet or powder with the latter.

Spirits and strong alcoholic solutions should be diluted only at time of administration.

Strophanthus decomposes gradually in water with the formation of a more poisonous substance: hence it should be dropped into water at time of administration.

VII. THE MANAGEMENT OF ACUTE POISONING.

Without going into detail in the matter of the definition and classification of poisons, nor to any extent into the symptoms produced by them, nor into toxicological analysis, we purpose to offer a few practical notes concerning the antidoting and treatment of acute poisoning by the energetic drugs most largely employed by Eclectic practitioners of medicine or encountered by them as used by others. It is not easy, nor is it practicable, for the physician to hold in his memory the antidotes and necessary procedures for all the poisons one may meet nowadays. While he can and should carry in his pocket a brief memorandum, most of such aids known to the writer are antiquated and of little practical value. The doctor would do better to compile his own list from authentic sources.

For this article we have purposely selected a few of the agents most commonly employed by or encountered by Eclectic physicians, for we are most frequently asked for information concerning these drugs. Some

others not so commonly employed by them are also included. It not infrequently happens that an overdose of medicine is unintentionally administered, or that through some circumstance—idiosyncrasy, perhaps—toxic effects result from ordinary or even small doses of energetic medicines. Several times we have known small doses of aconite, belladonna, opium, lobelia, and ipecac to produce symptoms that might be regarded as mildly toxic. It is presupposed, in the matters treated of in this connection, that the drug taken and the amount are known. Therefore no space will be taken up in the consideration of discovering the unknown drug.

General Considerations.—The first consideration in a case of acute poisoning is to get the poison out of the stomach as quickly as possible. At the same time there may be given such agents as are known to combine with or convert the poison into a harmless or, at least, less soluble condition or salt, or to physiologically antagonize its effects. Only substances that will dissolve in the fluids used or in the juices of the stomach will act as poisons. Hence, to render them less soluble or to throw them out of solution is a step always to be taken advantage of. Empty the stomach by the quickest known method.

Means.—Emetics head the list of necessities. The quick-acting or irritant emetics are to be selected, except where the gastric membranes are so obtunded as to fail to respond to the emeto-stimulus, or when narcosis is profound. In such cases *Apomorphine hydrochloride* (1-8 to 1-10 grain) hypodermatically is the most reliable aid. The list of good emetics include:

Zinc sulphate, the best emetic for internal use; grains 20 to 30 in 2 ounces of water. Children, smaller doses (5 grains); repeat every 10 to 15 minutes until free emesis occurs.

Copper sulphate, grains 10 in 2 ounces of water.

Mustard, one-half to one tablespoonful in a half pint of lukewarm water; follow with plenty of tepid water. A teaspoonful of salt may be added if desired.

Melted fats and *bland oils* are often protective, envelop and retard the action of the poison, and often produce emesis. They have little antidoting power (except in alkali poisoning) and should *not* be used in cases of poisoning by phosphorus, thymol, cantharides, or carbolic acid (phenol).

With all emetics the patient should be made to drink from a pint to a quart of tepid water, and be encouraged to tickle the soft palate or to press down the base of the tongue with the finger. These are great aids to vomiting and alone may be sufficient to thoroughly empty the stomach.

Other Emetics.—If the above-named emetics are not at hand, use—

Ipecac, powdered, 30 to 40 grains in lukewarm water.

Specific Medicine Lobelia, one-half to one teaspoonful in warm water.

Compound emetic powder, one to three teaspoonfuls in plenty of warm water. Especially valuable where a stimulating effect is desired.

Acetous emetic tincture, one to three teaspoonfuls in plenty of warm water.

Stimulants.—These are often required in depressive poisoning. The best agents are:

Brandy or whisky, two teaspoonfuls every 10 or 15 minutes, or 30 drops hypodermatically, using care not to produce alcoholic poisoning.

Aromatic spirit of ammonia, one teaspoonful every 10 or 15 minutes, or 30 drops hypodermatically.

Ether (sulphuric), 15-drop doses hypodermatically repeated as often as necessary to keep up the circulation.

Coffee. Freshly prepared, strong black coffee freely administered.

Atropine sulphate, 1-100 grain hypodermatically often has a sustaining stimulant action upon the breathing and the heart.

Strychnine sulphate 1-20 to 1-30 grain hypodermatically, will help sustain the heart-action.

Antidotes are of two kinds, *chemical* and *physiological*.

Chemical antidotes combine with the poison to form new and harmless or less harmful compounds, or render it insoluble or less soluble. Examples: Egg-whites (albumen) for corrosive sublimate; common salt for silver nitrate poisoning.

Physiological antidotes are those which counteract the effect of the poison which has been absorbed. Examples: Belladonna for opium poisoning; stimulants in nerve-depressing poisons; coffee in opium narcosis.

Sometimes both chemical and physiological actions are exerted by the same antidote.

The Stomach Pump.—This should be used where emesis is not easily accomplished. It should not, except rarely, be used where the membranes are destructively corroded or softened by the poison.

Lenitives and After-treatment.—Among the best lenitives for after-treatment are mucilages of starch, slippery elm, or acacia, albumen, milk, flaxseed tea, flour and water, oatmeal gruel, etc., and liquor bismuth and bismuth subnitrate. If these do not relieve irritation or pain, opiates, or hyoscyamus or similar agents, may be cautiously employed.

Poisons. *Acetanilid* (and other coal-tar antipyretics).—Recumbent posture; stomach pump or emetic of mustard or zinc sulphate. Stimulate with aromatic spirit of ammonia, ether, brandy, or whisky. Give strychnine, 1-30 grain, to effect, and atropine sulphate to sustain arterial pressure and breathing. Artificial heat and forced respiration.

Acid, Carbolic (Phenol).—Give freely of whisky, or dilute alcohol (cupful of alcohol and water, equal parts) and sulphate of magnesium (Epsom salt), or sulphate of sodium (Glauber's salt). Administer also diluted vinegar. Soapsuds, albumen, and mucilages retard the action of carbolic acid. Employ stomach pump at once, and repeatedly wash out the stomach. If pump is not at hand, give hypodermatic of apomorphine hydrochloride, 1-10 grain. If no other means of emesis is at hand, use mustard.

Acids, Corrosive (*Nitric, Hydrochloric,* and *Sulphuric*).—Neutralize with alkaline substances, as lime water, soda solution, soapsuds, plaster from wall, oxide of magnesia. Use plenty of water and employ stomach tube. Avoid the use of the emetic if possible, for, if stomach is much corroded, the action is liable to rupture it; hence the preference for the stomach pump, or trusting to the results of chemical neutralization.

Aconite.—Insist on recumbent posture, with head lower than the feet. Use stomach pump if possible. Emetics act poorly; if used, select mustard in plenty of warm water. Give strong tea and coffee. Use artificial respiration if breathing flags. Use stimulants, ether, brandy, aromatic spirit of ammonia, atropine sulphate. Maintain quiet as much as possible.

Æsculus.—Use emetic of mustard or zinc sulphate or stomach pump. Stimulate freely.

Alcohol.—Siphon out stomach, or give an emetic of mustard or zinc sulphate. Provide plenty of fresh air, and give ammonium chloride, 30 grains in half pint of warm water. Apply heat to body, and support the heart with strychnine nitrate, 1-30 grain, hypodermatically. Inhalations of aqua ammoniæ cautiously administered may be of service. If asphyxiated, the electric current may revive. Draw the urine.

Alkalies.—Neutralize with diluted vinegar, lemon or orange juice, or citric or tartaric acid, well diluted. Or convert into soaps by the use of bland oils or fats—melted lard, cottonseed or olive or sweet oil. Avoid emetics if stomach pump can be used, lest the softened stomach membranes become ruptured by the act of emesis.

Alkaloids (and their Salts).—For this class of salts the following have been repeatedly recommended as valuable antagonists: Tannin, by reason of forming insoluble tannates with alkaloids; permanganate of potassium for morphine and strychnine; and animal charcoal, iodine, and albumen. Emetics are usually needed, and cathartics in some cases.

Antimony (Tartar Emetic and other Salts).—Give freely of solutions of tannic acid, or preparations containing tannin (table tea, infusions of vegetable astringents); opium to check evacuations; and use the usual means to combat inflammation. Alcohol and digitalis may be required to support the circulation.

Arsenic.—(See *Fowler's Solution.*)

Atropine.—(See *Belladonna;* also *Alkaloids* and their Salts.)

Belladonna.—Stomach pump or emetic of mustard, zinc sulphate, or ipecac, or apomorphine hypodermatically. Keep patient in motion. Small doses of opium, morphine, or muscarine are physiologically antagonistic. Be governed by action of pupils in antidoting with opium preparations. Pilocarpine nitrate said to be best physiological antagonist. Employ heat to body, stimulate with brandy or ammonia, use artificial respiration, and catheterize to prevent reabsorption of poison from the urine.

Bryonia.—Empty the stomach by siphon or emetic, using water copiously. If bowels have not freely moved, purge with Epsom salt or castor oil or demulcent enemata. Give freely of demulcents, stimulate with brandy or whisky, maintain body heat by external warmth, and administer morphine or other opiates to control pain and allay nervous irritability. Hot fomentations to the abdomen.

Cannabis.—Stomach pump or emetic of mustard, zinc sulphate, or apomorphine. Give strong tea and coffee. Keep patient in motion and awake. Liberal doses of sweet spirit of nitre to encourage renal action. Catheterize, and give stimulants, particularly small doses of specific medicine belladonna or atropine sulphate.

Cannabis Sativa (American Hemp).—Treat same as for *Cannabis.*

Cantharis.—No chemical antidote. Use stomach pump preferably, or emetic of zinc sulphate, or mustard, or ipecac, or apomorphine hypodermatically. Give opium to relieve pain, stimulate with brandy. Use artificial heat and demulcent drinks. *Do not use oils.*

Chloral.—Recumbent posture, with head lower than feet. Empty stomach with tube. Emetics are debilitating. Give liquor potassæ (2 drachms in half pint of warm water) every hour. Give plenty of strong coffee or tea, and siphon out; or administer them per rectum. Strychnine sulphate 1-30 grain, or picrotoxin 1-60 grain, or amyl nitrite (3 to 5

minim pearl crushed and inhaled), or brandy or whisky. Oxygen by inhalation; also ammonia. Apply cold to head, artificial heat to body, keep patient awake by shaking, flagellation, shouts, or by electricity. Artificial respiration, if breathing is labored.

Chloroform.—Press jaw forward, and draw out tongue; use artificial respiration, slap the chest vigorously, forcibly and quickly dilate the rectum. Inject atropine sulphate and strychnine, or nitro-glycerin; employ external heat, and avoid alcohol or ether.

Cocaine.—If used hypodermatically: Recumbent position, fresh air, artificial respiration, stimulants, and electricity. Brandy, ether, strychnine, atropine, belladonna, nitro-glycerin, or strong coffee may be used as stimulants.

If swallowed: Precede treatment with use of stomach pump or emetic of zinc sulphate, mustard, or ipecac. Give tannic acid or strong tea freely and repeatedly while washing out the stomach. Control convulsive attacks with chloroform or ether.

Colchicum.—Empty the stomach with tube or emetic. Give freely of tannic acid or strong tea. Use demulcents, as milk, eggs, mucilages, etc. ; employ artificial heat, relieve pain with opiates, and stimulate freely. Hot fomentations to the abdomen are grateful, and the bowels should be evacuated with castor oil.

Colocynth.—Treat same as for *Bryonia*, which see.

Conium.—Evacuate stomach by stomach pump or emetic of mustard. Give tannic acid or strong tea freely. Give demulcents. Keep head low; use stimulants as indicated, artificial heat, and artificial respiration.

Digitalis.—Recumbent position. Stomach pump or emetic (zinc sulphate, mustard, ipecac, or apomorphine). Give tannic acid (30 grains) or strong tea freely while emesis is going on. Purge with Epsom salt or Rochelle salt. Fluidextract of soap bark or fluid-extract of senega are physiologically antagonistic. Give in 10-drop doses in tablespoonful of water. Aconite and tincture of opium may also be used. Stimulate with brandy or ammonia, and employ artificial respiration.

Elaterium.—Treat same as for *Bryonia*, which see.

Fowler's Solution of Arsenic.—Give freely of freshly prepared hydrated sesquioxide of iron, or use the official antidote (ferri hydroxidum cum magnesii oxidum), both in tablespoonful doses every few minutes. Use stomach pump or emetics repeatedly. Follow with opiates to relieve pain, and use stimulants to sustain circulation and respiration.

Ergot.—Recumbent position; stomach pump or emetic. Plenty of strong tea or coffee, or solution of tannic or gallic acid. Purge with castor oil, Epsom salt, or 1 drop of croton oil; stimulate with nitro-glycerin, brandy, whisky, strychnine, or atropine. Employ friction and artificial heat.

Gelsemium.—Siphon out the stomach, preferably, or give emetic of zinc sulphate, or mustard, or ipecac, or apomorphine. Give repeatedly liberal quantities of strong tea or tannic acid (30 grains) in plenty of water. Purge with castor oil. Stimulate with belladonna or atropine, or whisky, strong coffee, aromatic spirit of ammonia, strychnine sulphate (1-60 to 1-20 grain every 2 hours), or digitalis. Morphine (1-4 grain every 2 hours, or as required) is considered the most perfect antagonist. It should be used with care. Resort to artificial heat and forced respiration if needed.

Helleborus Niger.—Same as for *Veratrum*, which see.

Horse Chestnut.—Same as for *Æsculus*, which see.

Hyoscyamus.—Same as for *Belladonna*, which see.

Ignatia.—Same as for *Strychnine*, which see.

Ipecac.—Wash out the stomach freely, give vegetable acids, as vinegar, lemon or orange juice, citric acid or tartaric acid, juice of currants, in plenty of water. Stimulate heart, if necessary, with brandy, atropine, ammonia, or digitalis.

Lead and its Salts.—For *acute lead poisoning* use a solution of the soluble sulphates (magnesium or sodium sulphates, or "sulphuric acid lemonade"); opiates for pain.

For *chronic lead poisoning* iodide of potassium (eliminant), opiates to relieve cramps and pain, castor oil or croton oil for intense constipation; electricity or strychnine to overcome paralysis.

Lobelia.—Keep patient in recumbent position, and for some time after acute symptoms subside. If stomach is not well emptied, use stomach tube or emetic, preferably zinc sulphate or mustard. Give freely of tannic or gallic acid, or strong tea and coffee. Purge with castor oil, and stimulate freely with whisky, ammonia, and heart stimulants, as strychnine, atropine, or digitalis. Use artificial heat, and morphine or opium may be required to relieve nervousness and pain.

Jaborandi (Pilocarpus and Pilocarpine).—Evacuate stomach by siphon or emetic. Give strong tea or tannic acid freely. Atropine sulphate is antagonistic, or belladonna may be used. Stimulate freely, give strong coffee; and morphine may be required to check nausea and vomiting.

Mercury Compounds.—Plenty of egg albumen whipped up in water. Evacuate the stomach rapidly by emesis or stomach tube. Employ stimulants and artificial heat to maintain circulation, and opiates for pain. (See also article on *Mercuric Chloride.*)

Morphine.—Same as for *Opium*, which see.

Nitro-glycerin.—Apply ice, or cloths wrung out of ice water, to head. Relieve headache with belladonna or ergot. Stimulate with whisky or strychnine, if heart flags.

Nux Vomica.—Same as for *Strychnine*, which see.

Œnanthe.—Same as for *Belladonna*, which see.

Opium (laudanum, paregoric, morphine, heroin, codeine, syrup of poppy, soothing syrups, black drop, Godfrey's cordial, Jackson's cough syrup, etc.). Keep patient moving by means of flagellation, shouting, slapping with wet towel, alternate dashing of cold and hot water, pinching, spinal cold douche, etc., but take care not to exhaust the patient; resort to artificial respiration, and stimulate as quickly as possible. Evacuate stomach by means of tube or emetic, apomorphine being especially valuable. Give early 10 grains of potassium permanganate in pint of water. Remove this solution as quickly as possible, and repeat if necessary. If latter is not at hand, use tannic acid, strong tea, or animal charcoal freely. Cautiously administer small doses of atropine or belladonna, and copious quantities of hot, strong coffee. Give sweet spirit of nitre to keep up elimination, and catheterize. Diffusible and heart stimulants should be given, and rectal injections of tincture of capsicum may quickly arouse from stupor. Apply artificial heat, and resort to forced respiration. Do not walk the victim to exhaustion.

Phenol.—(See *Acid, Carbolic.*)

Phosphorus.—Do not give oils or fats, except old, thick (oxidized) oil of turpentine. Use stomach pump or emetic of sulphate of copper or mustard. Give freely of Epsom salt in solution. Opiates to relieve pain.

Physostigma.—Empty stomach with tube or emetic. Give strong tea or tannic acid, or potassium permanganate (10 grains in 1 pint of warm water). Atropine (1-120 to 1-60 grain) is best physiologic antagonist; chloral (10 grains every 1-2 to 1 hour) next. Stimulate and support heart with strychnine or nux vomica. Resort to artificial respiration.

Phytolacca.—Siphon or emetic, with large quantities of water. Stimulate with brandy, ammonia, and relieve irritation and pain with bismuth and opiates.

Rhus.—(Internally.) Treat as for *Sanguinaria*, which see. Purge with magnesium sulphate.

Sanguinaria.—Wash out the stomach, or use emetic of zinc sulphate; give strong tea or tannic acid, stimulate freely, and administer opiates, bismuth, or demulcents to allay gastro-intestinal irritation and pain.

Santonin.—Siphon out stomach or use emetics. Stimulate the heart with aromatic spirit of ammonia and strychnine, and give freely of strong coffee. Control convulsions with ether or chloroform.

Scopolamine.—(Treat as for *Belladonna*, which see.)

Silver Salts.—Give freely of solution of common salt. Administer albumen or milk as demulcents, evacuate the stomach, stimulate if necessary, and relieve pain with opiates.

Staphisagria.—Same as for *Bryonia*, which see.

Stramonium.—Same as for *Belladonna*, which see.

Strophanthus.—Treat practically the same as for *Strychnine*, which see. Give also purge of Epsom salt, and employ artificial respiration. Emetics to be used are zinc sulphate or mustard.

Strychnine.—Empty stomach *quickly* by means of stomach pump or emetic; next to useless after tetanic symptoms have set in. Keep patient absolutely quiet, in recumbent position, in dark room. Allow no draughts of air to blow upon patient. Give freely of animal charcoal or tannic acid in water. Control spasms by inhalations of chloroform or chloral hydrate (by mouth, 30 grains; or by rectum, 60 grains). Potassium permanganate and iodine are said to be chemical antidotes. They must be given well diluted, and promptly removed from the stomach.

Sulphonal.—If in the stomach but a short time, siphon or give an emetic (zinc sulphate or mustard, or apomorphine, with plenty of water). Administer Epsom salt (1-2 ounce) and sodium bicarbonate (1 drachm) in plenty of water. Give 2 teaspoonfuls of sweet spirit of nitre every 1 or 2 hours. Support the heart and lungs with diffusible stimulants and strychnine hypodermatically.

Trional.—Same as for *Sulphonal*, which see.

Veratrum.—Recumbent position, with plenty of fresh air. If free vomiting has not already occurred, evacuate the stomach with the stomach tube; or, if not at hand, use emetic of zinc sulphate or mustard. Give freely of tannic acid in solution, or of strong tea or coffee. Stimulate freely, employ artificial heat and forced respiration. Give opium or morphine to quiet pain and restrain action of the bowels. Hot tea assists in rapidly eliminating the poison by way of the kidneys. Catheterize.

Veronal (Barbital).—Same as for *Sulphonal*, which see.

Zinc Salts.—Tannic acid and albumen freely. Evacuate the stomach. Give lime water, soap suds, mucilages, and milk. Apply heat to abdomen and give opiates to relieve pain.

VIII. THE DISPENSING OF MEDICINES.

The necessities of the early Eclectics made them office pharmacists, and as such they prepared and dispensed their own medicines. Most of the remedies then in use among them and many of those just being introduced were not to be found in apothecaries' shops; besides, being counted irregular, there was not that harmony conducive to a good drug service between the doctor and the druggist. Moreover, the history of Eclectic progress shows that much of the vegetable remedies in use at the time the Eclectics came into the field were next to worthless, having been prepared from old or indifferent material. The Eclectic, crude though his methods may have been, and however inelegant his products, produced powerful medicines. This may be attributed to his study of plants and plant conditions, and to his partiality to fresh or to carefully preserved crude materials. Office pharmacy became popular among our physicians, and it was taught in our colleges. Gradually the making of medicines became largely a thing of the past, as Eclectic pharmacy *per se* supplied the necessary and reliable products desired—products of full strength, greatest power in smallest compass, and unsurpassed in elegance and convenience. But while the preparation of stock medicine was largely discarded, the custom of dispensing medicines from the office and during visits to the sick remained in vogue and has continued to this day and with ever-increasing popularity. The advantages of this custom are best known to those who follow it, and space will not be taken up in enumerating them. That they outnumber and outweigh the objections offered to the practice is evident from the tenacity with which our physicians cling to it and by the eagerness of manufacturers to place tablets and other forms of dry medicines in small compass directly into the hands of the physician. These forms, however, have never yet supplanted reliable liquid medicines. We would say something, however, concerning the methods of dispensing. In the earlier days the conveniences for dispensing were not what they are now. The prescriber then had to dispense his own medicines. In this he followed his own fancy, and the ways of men left to themselves differ greatly. The paramount thought of all was the quality and power of the medicine and what it could accomplish therapeutically. Esthetics did not always enter into the dispensing of such medicines. The customary doses of nauseous medicines swallowed by people led them to expect nothing pleasant in the giving and the taking of medicines. Little uniformity or elegance then accompanied office dispensing, and we are sorry to note that antiquated and even slovenly methods still prevail among many, who may be good therapeutists. That the physician so dispensing harms not only his own practice but that of all followers of his school, for most Eclectics dispense, probably does not enter his mind. To such we would plead for a more elegant and up-to-date method for the good of the physician, the patient and the school at large. Were a druggist of to-day to dispense medicines as we have many times seen them dispensed from the doctor's office, he would soon have to part with his store and fixtures. An attractive store and elegant service draws trade. We have seen doctors use all sorts of bottles, some even using flavoring extract vials, and old corks, in dealing out their medicines. A label to match, with the directions scrawled upon it with a pencil, and a

piece of newspaper or a page torn from an almanac, or a journal, if perchance a sample copy has strayed their way, complete the package. Sometimes the label is pasted on, or perchance a string or rubber band holds it in place. Paper of any sort and size is used to envelop powders. These days will not long permit the continuance in practice of those who are thus careless and slovenly in the dispensing of medicines. Bottles must be of good quality and should have good new corks. The label should be neatly printed or engraved and should convey the necessary directions. The doctor's address should be on the label, the office hours particularly appearing, and it should display no flaunting advertising matter. Suitable wrapping paper may now be had in tints and texture to suit the most fastidious, cut to size desired or rolled upon standards, furnished with a cutting blade. Powder papers of proper size, uniformity, and flexibility may now be had, and capsules, if not contraindicated, may be made to carry objectionable-tasting powders. All these cost but a trifle in the dispensing of a day and yield the dispenser untold profit. Medicines should not be compounded in the office in the presence of the patient, but all medicines should be out of sight in a laboratory or airy and well-lighted room devised for the purpose. Pills and tablets may be dispensed in small boxes or envelopes, and the homœopathic vials come into frequent service for pills, powders, or tablets, as well as for liquid medicines to be administered by drops. We knew a physician in Cincinnati, originally a homœopath, but with a strong leaning toward Eclecticism, who acquired an aristocratic patronage and amassed wealth largely through his punctiliousness in dispensing. He employed a chemist to compound his medicines, invariably dispensed them in homœopathic vials with velvet corks, the vials being placed in a handsome paper box and imbedded in jeweler's cotton. This, you will argue, was going to extremes. Perhaps it was, but it pleased his clientele and brought him a good round fee for his wisdom in so doing. That such a procedure would not suit all classes we freely admit, but we are safe in predicting that no patient will object to neatness and elegance in the dispensing of medicines; and that few there be who do not rebel, mentally at least, when slovenly served.

Vehicles, Flavors and Corrigents.—What shall I use for a vehicle for my medicines? is a question the doctor frequently asks. Wherever it is practical we have no hesitancy in saying that water is the best and most uniform solvent and carrier for most medicines. Eclectics especially are wedded to water as a vehicle. If a medicine is disagreeable water seldom makes it more so, but, on the contrary, dilutes it so as to lessen its objectionable taste. The more a medicine is fortified with alcohol or other preserving or flavoring material, the sooner, as a rule, will the patient tire of taking the medicine. There are, of course, well-known exceptions to this. For instance, water increases the objectionable qualities of the valerianates, and by some patients sodium salicylate can not long be taken in water alone. Fluidextract of licorice with essence of wintergreen is the best combination we have found to render the salicylate pleasant and endurable.

Unfortunately medicines put up in water alone do not keep well. Something must be added to counteract change. If the medicine is one that can be given in an acid medium and an acid is required by the patient,

nothing serves better than hydrochloric or phosphoric acid. Glycerin is a favorite with many, for as a rule whatever can be dispensed in water can be dispensed in glycerin and water in variable proportions. This imparts slight sweetness to the medicines, tends to act as an antiseptic, and is particularly grateful to the stomach. We are aware that some object to its use, claiming that it tends to irritate the throat by causing abstraction of water therefrom. This we have not encountered when plenty of water is admixed with the glycerin. Such medicines as specific medicine iris, specific medicine cannabis, and specific medicine chimaphila, are best dispensed in glycerin with directions to add a certain quantity to water when the dose is to be administered. The aromatic, or medicated, waters find some advocates, but their use is limited as compared with former years. The best agent we have used in dispensing at the bedside, and particularly for children, is a few drops of specific medicine cinnamon. It gives a pleasant taste, mixes fairly well, sweetens and tends to preserve the mixture, and is decidedly antiseptic. It is seldom contraindicated, and if too much has been used it can be readily removed by dipping into the solution a piece of bibulous paper. Essence of cloves is also a good flavoring preservative, but lacks sweetness.

An elegant preparation used by many is the simple elixir. This is, of course, quite strongly alcoholic, and already the alarmists are justly calling attention to the danger of fostering a taste for alcohol by its long continued use. Chloroform is one of the best flavoring, sweetening, and preserving agents, and is especially useful in summer. It may be used as chloroform water, readily prepared by shaking a drachm of chloroform in a quart of pure water, leaving always an excess of chloroform in the bottom of the container. This has the advantage also of being a pain reliever of especial value in gastro-intestinal disorders, flatulence, and as an ingredient of cough medicines. Another method is to mix equal parts of chloroform and alcohol (making practically chloric ether) and adding a few drops to the mixture to be dispensed. The chloroform water is to be preferred to this, as the chloroform frequently separates from alcohol on the addition of water. For medicines that permit of an alkaline medium, asepsin is a useful flavoring, sweetening, and preserving agent and is also carminative. Either asepsin or essence of wintergreen may be added to specific medicine macrotys when used as an antimyalgic and antirheumatic. When not contraindicated and a flavor is desired for the dispensing of medicines, the following agents not named above may be used: Specific medicines anise, caraway, cardamom, coriander, glycyrrhiza, nutmeg, orange-peel (bitter), pennyroyal, peppermint, pimenta, sarsaparilla, sassafras, and spearmint. Compound tincture of lavender is useful in preparations for infants, and camphor-water as a vehicle for gastric and bronchial sedatives.

Often it is desired to overcome *odor* or *bitterness*. For the former the neutralizing cordial or glyconda, or syrup of sarsaparilla compound, are useful, if not otherwise objectionable. To overcome bitterness, syrups of licorice, coffee, chocolate, and eriodictyon compound are more or less effective, especially with quinine salts. Finally, simple syrup, plain or flavored, may be used as a vehicle for many medicines, but the disposition nowadays is to reject sugars on account of their tendency to induce

fermentative conditions in the gastro-intestinal tract. Should a syrup be desired, however, a choice may be had of the following: syrup of orange flowers or orange-peel, wild cherry, tolu, citric acid, ginger, vanilla, wintergreen, or red raspberry. After all, water is the best medium for the administration of most fluid medicines, and as such has long been used by modern Eclectics who see little reason to depart from the practice.

Coloring Agents.—It is sometimes desirable, for one reason or another, to color medicines that are colorless or nearly so when put up in water. We do not favor this, though many do, and undoubtedly is has its effect upon the patient—being one of those acts of so-called "harmless deception." For this purpose agents must be employed which impart color and practically no taste. One of the least objectionable of these is caramel (a heavy semi-liquid burnt sugar). A very little of this will impart a beautiful transparent yellowish-brown to deepest brown tint, according to quantity used. We are not aware that it counteracts any of the commoner medicines in use. Owing to the irritating fumes given off in preparing caramel it is better to purchase it than to attempt to prepare it. It is cheap and a little of it goes a long way. For a yellow color, tincture of turmeric (curcuma) may be employed. A beautiful red is imparted by solution of carmine, and this is to be preferred over tincture of cochineal, once largely used, but which spoils readily owing to the fatty bodies present. As solution of carmine is alkaline through the small quantity of ammonia water employed in producing a clear color, it can only be used to color neutral or alkaline mixtures. As a rule alkaline substances should not be used where there are present powerful alkaloids. For coloring acid mixtures, tincture of cudbear will give a beautiful bright red tint. If these agents are not desired for coloring, dealers in essential oils carry various colors freed from all harmful ingredients, which can be purchased at reasonable prices.

The following Specific Medicines have been prepared to meet the needs of Eclectic physicians for either bedside or office dispensing: Specific medicines caramel compound (brown), cochineal (red), cudbear (purple-red), curcuma (yellow), logwood (red), Poa pratensis, or blue grass (green). Syrup of red raspberry (Syrupus Rubi Idæi), when miscible and a syrup is not objectionable, is a favorite with many. It imparts a beautiful red color.

This demand for colored medicines is occasioned by those patients who feel that they are getting better medicines when the latter appear more like those issued from the pharmacies. Personally, we shall welcome the day when all medicines are colorless, or as nearly so as it is possible to make them, for the natural color in most of them is only plant or other forms of dirt.

Ointments may be colored pink with liquor of cochineal, from pink to red with powdered cochineal, yellow with curcuma, or green with chlorophyll. There is no good reason, however, for adding colors to ointments, and certainly none for any that may stain the tissues or garments. Practically all ointments have more or less color of their own due to the necessary ingredients they contain.

IX. SPECIFIC MEDICATION.

The theory of Eclectic specific medication is essentially as follows: Disease is a wrong or impairment of life. It may be due to forces, living or dead, within or without the body. Clinically it is manifest through well-defined symptoms or disease-expressions. The totality of symptoms express a complex or state to which, in common nosology, a special name is given: that is, it is called a disease, as pneumonia, rheumatism, dysentery, etc. This disease-name is of value in the study of the natural history of disease for statistical data, for the purpose of recognizing contagion and infections, and for establishing a prognosis. The specific medicationist recognizes the necessity for such a nosological diagnosis for the purposes named, as do others of associated schools of medical practice. Unlike the latter, however, the Eclectic specific medicationist does not use such a diagnosis as a guide to aid him in drug selection. For therapeutic purposes he resorts to analysis of these group-symptoms or symptom-complexes (diseases) and attempts, so far as drug application is concerned, to discover the varying conditions of the patient regardless of the named disease, as evidenced by certain well-defined and specific symptoms revealing disease-expressions.

Specific medication takes into account the facts that medicines have a certain force and are definite in action. Like effects flow from like causes. Hence, having found, by repeated experimentation, the opposing action of a drug in a condition of disease as expressed by definite symptoms, belonging to it and to it only—whether objective or subjective—the same remedy will relieve or cure like abnormal conditions no matter what the name of the disease may be. Specific medication holds that there is a fixed relationship between drug-force and disease-expression.

Specific medication does not admit of specifics for diseases as such, but specific remedies for specific conditions (phases of disease) of such diseases. *Specific Diagnosis* implies diagnosis to discover the condition curable or remediable by a certain remedy, the latter having been established as such by previous experimentation or experience; and *Specific Medication* means the application of the known remedy for the phase or condition of disease so found. Specific diagnosis is, therefore, therapeutic diagnosis; not nosological diagnosis. Specific diagnosis is not for the purpose of finding out what the disease may be called, but what the specific condition and its remedy is. In practice the Specific medicationist is guided by the *Specific Indication*—a term used to express the fact that a specific condition existing as a *part* of a disease, and shown by *symptomatic expression*, *indicates* the employment of the remedy which has been repeatedly found to correct that abnormal phase or wrong of life.

The Eclectic recognizes no law of cure. In this he differs from the Homœopath. While he also prescribes symptomatically (with some exceptions) in this resembling the latter, he does not prejudge the effect of his medicines because it has produced a certain action in *health* (drug proving). His prescribing is based upon past experience with a drug used successfully in *disease-conditions*. Empiricism enters largely into his practice, but rationalism or experimentation is not ignored. Both experience and to a lesser degree the results of pharmacological investigations

furnish the basis of his medication, but he is guided in the administration of drugs by symptoms expressing conditions known to be specifically met by a drug and that drug only.

Specific medication has a curative or palliative effect (according to the curability or non-curability of the disease-condition existing) when the known specific drug is specifically administered—a single medicine being effective in the *same* abnormal condition occurring in diseases even though the latter appear widely different from each other, if the name of the disease alone be considered.

As examples of specific indications the following may be noted: the strong, large and full bounding pulse, indicates veratrum; the small frequent pulse in acute illness not depending upon sepsis, indicates aconite; the sharp, cutting or lancinating pain in serous tissues, bryonia; full, oppressed breathing, with sense of præcordial oppression and dyspnœa, not due to a diseased heart, lobelia; the moist tongue, soft, moist skin, open pulse and marked periodicity, but with freedom from nervous excitement, quinine; cadaverous odor of the secretions, potassium chlorate. Thus veratrum, or aconite, or bryonia, may equally be indicated in pneumonia, in pleurisy, or in acute rheumatism accordingly as the specific conditions are in evidence through specific indications.

Classification of Specific Diagnosis and Specific Medication.—It is not possible, at present, to make a classification of Specific Medication that will perfectly represent it. The following scheme, however, will aid the student to an understanding of its more important features:

I. *Preventive Medicine.*
   (*a*) General hygiene.
   (*b*) Mental or psychic influence.
   (*c*) Ablutions.
   (*d*) Massage.
   (*e*) Electricity.
   (*f*) Dietetics.

II. *Pathologic Diagnosis and Medication.*
   (*a*) A knowledge of wrong in structure or function.
   (*b*) A knowledge of drugs which influence wrongs of structure or function.

III. *Symptomatic Specific Diagnosis and Medication.*
   (*a*) Symptoms as expressions of pathologic processes.
   (*b*) Symptoms as related to palliative remedies.
   (*c*) Symptoms as related to curative drugs.
   (*d*) Epidemics and the relation of drugs thereto.
   (*e*) Endemic remedies.
   (*f*) Basic conditions and the basic remedy.

IV. *Chemical and Physical Specific Medication.*
   (*a*) Catalytic action of drugs.
   (*b*) Antidotes and Antagonists.
   (*c*) Antiseptic or antiputrefactive action of drugs.
   (*d*) Antiparasitic action of drugs.
   (*e*) Antitoxic action upon toxines.
   (*f*) The supply of deficient chemical constituents to the body.
   (*g*) The chemical and physical destruction of formations and concretions upon or within the body.
   (*h*) The relation of drugs to metabolic processes.

V. *Surgery.*
   (*a*) Palliative.
   (*b*) Curative.

I. **Preventive Medicine.**—Preventive medicine is always specific. Within its province comes:

(a) The study of *dirt* (to use a homely expression), whether it be dirty surroundings giving rise to disease through infection or contagion, or whether it be dirt generated within the body, as ptomaines, bacteria, and their toxins, or what not. The prophylactic use of diphtheria and tetanus antitoxins and the antityphoid and antivariola vaccines come within the legitimate scope of preventive specific medication. Other forms of preventive biologic medicine have not, as yet, been sufficiently proven as to become accepted as a part of specific medication.

That "cleanliness is next to Godliness" is an old, but true, dictum. It applies especially in medicine. Our first duty toward the sick is to make his surroundings pleasant and cleanly. Not alone must the environment be clean, the food and drink clean, but the patient must be made as clean as possible, inside and out. This was a strong contention with the formulator of specific medication; and has been rigidly insisted upon by those whom he taught. Hygienic conditions must be safeguarded. Sunlight, wholesome air, and protection, as far as possible, from contamination through irritant and noxious gases, and the foul effluvia of privy vaults and sewers, are inalienable rights of the sick individual.

(b) The patient's psychic or mental condition should have its quota of attention. Pleasant companions, cheerful surroundings, and wholesome literature and entertainment are more essential to some mind-sick mortals than any form of medicine ever could be.

(c) The patient should be properly bathed, in one form or another, as indicated. Unless contraindicated, water should be given freely; and sometimes lavage and enemas are essentially specific measures for the relief of disease. As water is the universal purifier, so also is it the most generally useful solvent for impurities within or without the body. Being always abundant and accessible it should be used more freely than it is by the majority of patients. There is no reason why physicians should overlook ablutions, inside and out, when considering specific means to fight disease.

(d) When able to take it a patient should be given plenty of properly-directed exercise. In the absence of exercise, manual manipulations may be substituted. Massage should be invoked for the benefit of those whose muscular tissues are lax, and nervous debility so great that either or both give rise to diseased states, or aggravate existing disorders.

(e) Electricity is a factor that should enter into specific therapeutics with a view to its special adaptability to disease-conditions, and as to its effects in producing disease. The excess of electrical force manifest in some persons whose work confines them to shops and offices where electric power and lights are used, is sometimes productive of functional disorders. Thus electricity as a remedy and electricity as a disturber of function may equally well be taken into consideration.

(f) The study of diet is a most important part of preventive, as well as of palliative and curative medicine. Its judicious application may prevent dyspeptic, intestinal, nervous, and nutritional wrongs—especially

diabetes, nephritis, arteriosclerosis, and other disorders now believed by many physicians to be chiefly due to errors of diet.

The importance of the foregoing will not be ignored by the careful physician; and it should all be included in the study of specific diagnosis and medication, and given equal consideration with drug medication.

Sections II, III, and IV deal with the outlines for the study of the specific application of drugs. These cover the subject of Specific Medication proper and include those features which have been most fully developed. By some they alone are held to constitute the only part of medicine that is to be considered as Specific Diagnosis and Specific Medication.

II. Pathologic Diagnosis and Medication.—In Section II we take into account the following: (a) the anatomic structure and physiologic functions of the normal body and the relation thereto of pathologic changes. To know a wrong of structure we must know the healthy body: to know a wrong of function we must know the normal function. Knowing the healthy part or function enables us to recognize the degree and kind of departure in pathologic states. Little would be gained, however, were we to rest here, where we have gone only so far as to find the wrong of life. We want to know what will change the morbid state to one of health, and this is the province of Specific Diagnosis and Specific Medication. We proceed as in subsection

(b) To study remedies as related to diseased or disordered structure or function.

III. Symptomatic Specific Diagnosis and Medication.—In Section III we have before us: (a) the study of drugs repeatedly known to have corrected abnormal conditions as evidenced by symptoms—symptomological selection. Here we must carefully note what pathological states have been repeatedly marked by the same symptoms, and, having recognized these conditions by the symptoms, apply the remedy which experience has proved best adapted to correct such wrongs.

(b and c) Some pathologic states are incurable; others, being curable, yield most readily when the known specific drug is applied. In other words, the relationship between a pathologic condition and the action of a certain drug or drugs is so unvarying that, if no mistake has been made in the specific diagnosis, palliation or a cure results.

(d) Epidemics seem to bear a peculiar relation to some remedies. It has been observed during years when epidemics were prevalent that there were among diseases occurring during or after the epidemic peculiar symptoms or disease-expressions indicating certain established remedies. Thus in one year the well-known indication for Baptisia was present; another season, the symptoms called for Rhus; while still another, Tincture of Iron Chloride was the most needed medicine. Further than this, it has been noted that a disease condition depending upon or having its origin in a former attack of illness occurring during an epidemic, even when coming on, or recurring several months or years after the original attack, is curable or relievable by the remedy whose indication was most prominent during the original epidemic. Such drugs have been denominated *Epidemic Remedies.*

(e) That which applies to the Epidemic Remedy is true also of Endemics and the Endemic Remedy.

(f) The relationship between basic conditions and causes of disease and the known remedy therefor has assumed wider significance and greater proportion in recent years, since scientific investigations have revealed the definite causative factors in a few diseases. Long ago the specific medicationist used sodium sulphite for the condition as expressed by symptoms denoting a zymotic causation of certain disorders. Long ago he recognized the importance of periodicity as an indication for quinine. As the periodicity, in malarial fevers at least, takes place while the pathogenic protozoa are going through a certain phase of their life-cycle (sporulation), he was right in applying his Specific Medicine for the condition as shown by the basic indication of periodicity, though he did not then know the exact cause of the condition. Thus it frequently happens that a whole train of morbid processes, call it disease if you will, depends upon a single primary or basic cause, giving rise to basic symptoms, and a remedy which will correct that basic wrong, will rectify the whole process of illness. This is the nearest the Eclectic specific medicationist has come to having "specifics for diseases." Even here he does not recognize malaria, but a phase of that disease recognizable by specific symptoms, as the basis for his prescribing. He even goes farther than noting mere periodicity, one of the main links in his chain of specific indications, but adds, "when the nervous system is not excited, the tongue is moist and cleaning, the skin moist, and temperature not elevated." In this one may readily detect the period of quiescence in intermittents, before the recurring chill and subsequent febrile exacerbation—the time recognized by most clinicians as the moment to administer the antiperiodic drug—a clinical condition and a therapeutic propriety, the philosophy of which is now well explained by our understanding of the presporulation period, or new invasion of the infecting protozoa. Here he does not treat the disease malaria, but the disease condition as expressed by specific symptoms. If it be contended that this amounts to "treating the disease," in this and a few similar instances, he has not viewed it as such, for he bases his procedure, as in medicating other conditions, upon the specific indications present.

There has always been a misconception as to the meaning of the term Specific as used in Eclectic medicine. The regular school long maintained the attitude that there were no specifics for diseases, but erroneously attributed such a claim to Eclectics, misconstruing this interpretation of Specifics for disease-conditions to mean "specifics for diseases."

Now the old school has its "specifics for diseases," as mercury and arsenic for syphilis and other spirillar diseases; thymol and oil of chenopodium, for hookworm disease, quinine for malaria, sulphur for the itch, salicylates for rheumatism, and numerous serums and vaccines for diseases due to infections.

Another example of the use of the Specific Medicine for a basic wrong is well-illustrated in certain gastro-intestinal disorders, several apparently separate conditions depending upon one prominent wrong, which, when corrected, is followed by relief from the other symptoms. Thus, when

seemingly uncontrollable vomiting is dependent, not primarily upon a disorder of the stomach, but is due to an irritation of the brain through determination of blood to that organ, as revealed by the symptomatic expressions—bright eyes, contracted pupils, and intense nervous agitation, —the remedy which will relieve is gelsemium. The surety with which that drug has repeatedly checked vomiting under these conditions entitles it to be called here the Basic Remedy.

IV. Chemical and Physical Specific Medication.—(a) Certain drugs are generally believed to induce or facilitate the breaking-down of tissues or the elimination of deleterious products of the body; or, if they are not directly the cause of such phenomena, or "retrograde metamorphosis" as it was once called, act as catalytics—drugs which by their very presence favor the elimination of waste material. The iodides are familiar examples of this class, and acetate of potassium is especially active as an eliminant. The larger number of alteratives, specific or otherwise, probably act in some manner so as to favor these processes.

(b) The chemical antidotes to poisons, as well as those which physically, or in some unexplained manner, antagonize the effects of poisons, belong within the domain of specific medication. The acids are specifically antagonistic to the action of alkaline substances, and the latter are used to antidote the acids by neutralization. Some chemical compounds act as specific antidotes by combining with the soluble poison to form insoluble salts, which by reason of their insolubility cannot enter the circulation and thereby exert their toxic effects. Such is the case when calcium carbonate (chalk) is administered to antidote oxalic acid. Other antidotes produce comparatively non-toxic products when combined with the poisons, as when albumen is used to antidote mercuric chloride poisoning, or when hydroxide of iron is employed to hinder the action of arsenic. In such cases, however, these apparently non-poisonous products must be gotten out of the stomach, for they are still poisons, though of lesser virulence than the original substance. Common salt prevents the toxic action of silver nitrate by forming the less poisonous silver chloride, thus giving more time to evacuate the stomach when a poisonous dose of the former has been swallowed.

(c) Some drugs destroy the lower forms of organic life. These are the antiseptics, and antiferments, and antiputrefactives. Notable in this class are phenol, mercuric chloride, salicylic acid, potassium permanganate, and asepsin. Salicylic and sulphurous acids and the salicylates and sulphites are active antiferments, and baptisia and quinine antiputrefactives. These drugs are indicated in disorders having putrefaction or fermentation as prominent factors. Hydrogen dioxide will destroy pus, and is also to a degree antiseptic. This is a very important and useful class of drugs, and for many of them specific indications have been established.

(d) Certain drugs specifically attack and overpower or kill parasites. Sulphur destroys the itch-insect and the harvest mite; corrosive sublimate, staphisagria, or cocculus, pediculi; santonin assists in the removal of the round-worm; quassia the seat-worm; granatum and male-fern the tape-worm, and thymol and oil of chenopodium the hookworm. Quinine and arsenic destroy certain protozoal parasites within the blood.

(e) Antitoxins antagonize the effects of bacterial toxines within the body, and some of them probably destroy bacteria or limit their activity. Most likely the specific action of mercury and of arsphenamine is due to a somewhat similar action, though purely bio-chemical, to that of the biological antitoxins. The established antitoxins are the antidiphtheric, the antitetanic, and possibly the Pasteur products for the treatment and prevention of rabies; and of the vaccines, the antivariolic and antityphoidal. Other serums and vaccines are as yet in the experimental class.

(f) Some drugs supply deficiencies in the constituents of the blood or other fluids, or correct abnormal conditions of those fluids. Acids are indicated when the blood is excessively alkaline (as shown by the deep redness of tissue); alkalies when lessened alkalinity (not acidity) predominates. (This is recognized by pallor of the tissues). Potassium chlorate is administered in pyæmia and septicæmia, and certain forms of septic absorption, for its chemical action upon the fluids of the body (cadaverous odor of secretions and excretions). Iron, phosphorus and sodium and potassium salts are given to supply deficiencies of such compounds in the tissues of the body.

(g) Another type of chemical and physical specifics includes those which act upon the solid substances and formations found upon or within the body. It is necessary to bring these agents into direct contact with the offending substance, as false formations or concretions within the tubal structures of the body. Thus hydrochloric acid will destroy bony excrescences, chloroform biliary calculi, could it be made to reach them, and such is the effect of pepsin and trypsin and other tissue digestants upon diphtheritic and other deposits, and the action of lithium and other alkaline compounds in dissolving the cementing substances and thus dissociating the particles of calculous concretions.

V. **Surgery.**—*Surgery* is always specific. It, like medicine, has its specific indications. There is a definite wrong depicted, a definite object sought, and a definite way of obtaining results. Surgical measures may be merely

(a) Palliative, as in paracentesis abdominis for ascites, due to malignancy, or for the removal of recurrent carcinomata. Or it may be

(b) Curative, as in the removal of the uterine appendages for ovarian disease, in appendectomy for appendicitis, or in cutting away a portion of the veins for the cure of varicocele.

XI. PRESCRIPTION WRITING

Definition.—PRESCRIPTION (Latin, *præscriptio*) is a term derived from two Latin words *præ* and *scribo*, meaning "written before." In the most restricted sense, a prescription is an *order* from the physician to the druggist for the preparation of a medicine, with instructions for its administration.

THE PRESCRIPTION BLANK.—A Prescription Blank should be either plain, or may bear across the top the physician's name, address, including city or town, and, if desired, his office hours and telephone number. As a convenience for Federal compliance it may also contain his Federal registry

number. It is not considered good taste or highly ethical to use blanks furnished by druggists, bearing their name and place of business, or any advertising matter.

DATE OF PRESCRIPTION.—Always *date* the prescription. The date is required on prescriptions coming under the Federal Narcotic Law and that pertaining to alcohol. Besides if a fac-simile or carbon copy of the prescription be preserved by the physician the date may serve as valuable data for record, or for use in case of litigation.

The date, preferably, should be written in full. To use only the calendar number for the month might cause confusion between the month and the day of the month. Thus 4. 9. '12 may be interpreted as April 9th, 1912, or may be read 4th day of September, 1912. Some avoid this chance of error by using Roman numerals for the month, thus IV. 9. '12. As the prescriber dates the prescription for record and reference for himself or to meet legal contingencies, it is the better part of wisdom to write the date in full.

NAME AND ADDRESS OF PATIENT.—The *name* and *address* of the patient should appear somewhere on the prescription, perferably in the upper left-hand corner. It insures the package being properly marked for the person intended, and when carbon copies are kept enables the prescriber to keep his records.

Prescriptions for Narcotics or Alcohol.—If the prescription is for or contains a narcotic coming under the ban of the Federal Narcotic Act, the *patient's name* and *address*, the *date of the prescription*, and the *name, address*, and *registry number of the physician* must appear on the order. If a quantity is to be given, or the prescription repeated, a valid reason must be shown thereon why it should so be acquired and administered, as when a patient is suffering from an incurable disease, or that it is necessary to sustain life. As the regulations of the Government change from time to time, the doctor must keep informed of such changes and prescribe accordingly.

In the case of alcohol only a certain amount may be allowed by the Government to be prescribed for a given time, and all of the items named above must appear upon the prescription. Not alone must the street address be given, but if the patient lives in an apartment its number must also be included.

Medical Latin.—Prescriptions are usually written in Latin, but few are correctly composed. For the latter reason it is better to write the order in English than to present it in bad Latin. As the chief purpose of the prescriber is to express himself so that his desires as to the preparation he orders cannot be misinterpreted, it matters little whether the prescription be in Latin or English. As a matter of fact in so-called Latin prescriptions, the order is written partly in Latin and partly in English.

Even among those who write prescriptions there are many in high standing who advocate the discarding of Latin entirely in prescription-writing. However, the greater percentage of prescriptions are written in Latin, more or less perfectly. The chief consideration urged against the

Latin prescription is the generally imperfect form in which it is written. The considerations for it are: It is a dead language, not subject to change, and is more definite and concise; it is the language of science; there are often several English names for the same substance and again the same English word is sometimes used for many substances. A very important reason is that, if constructed in Latin, the patient is ignorant of the drugs ordered, and therefore cannot set up his own prejudices and fears, and exercise his own self-supposed better judgment against that of the prescriber, as to the action and dosage of the medicine ordered. Moreover, it avoids the establishment of self-medication on the part of the patient. Latin prescriptions, being in an unchangeable language, are readily understood and easily translatable in any part of the civilized world.

The names of drugs, in official guides and materia medicas, are usually given in Latin and in the nominative case. These are followed by English synonyms. For the purpose of writing prescriptions, changes in the termination of these names are important and necessary to be learned by the prescriber. To write a prescription in Latin then:

1. The first requisite is to know the Latin name or title of the drug, which is always in the *nominative case.* Examples: Morphin*a*, Quinin*a*, Cinchon*a*, etc.

2. In the list of ingredients in the prescription the Latin *nominative* is changed to the *genitive*, it being an order to the pharmacist. Thus, Quinin*a* sulphas is changed Quinin*æ* Sulphat*is*, Morphin*a* Hydrochlorid*um* to Morphin*æ* Hydrochlorid*i*, Cinchon*a* to Cinchon*æ*, etc.

3. The directions to the druggists as to method of compounding is usually abbreviated Latin, therefore the word terminations are not required to be learned by the prescriber.

RULES AND GROUPS OF TERMINATIONS.

Remembering, then, that the Latin official name of a drug is in the *nominative*, and that the names of the drugs in a prescription are written in the *genitive* (the prescription being an order to the druggist), it is necessary to know the Latin official drug name and the change of termination into the genitive. The following rules, groups, examples, and exceptions will help the prescriber to formulate any prescription.

a—Nouns ending in the Latin nominative in *a* change, in the genitive, to *æ*. Example: Morphina (nom.), Morphinæ (gen.).

[*Exceptions:* Aspidosperma, Cataplasma, Enema, Gargarisma, Physostigma, and Theobroma. It will be observed that each of these names end in *a* preceded by *m*; these take the genitive *atis*. Folia is plural; foliorum is the genitive; Coca is usually unchanged though some write it Cocæ.]

It will help if the student will remember that (1) all names of *alkaloids* end in the nominative *a* and change in the genitive to *æ;* (2) that the terminology of *classes* of preparations whose names end in *a* also take the genitive *æ*, as Aqua (æ); Tinctura (æ); etc.

ma—Nouns ending in the Latin nominative in *ma* change, in the genitive, to *atis* (see Exceptions above). Example: Aspidosperma (nom.), Aspidospermatis (gen.).

as—Nouns ending in the Latin nominative in *as* change, in the genitive, to *atis*. Example: Sodii Bicarbonas (nom.), Sodii Bicarbonatis (gen.).

[*Exceptions:* Asclepias nom.), Asclepiadis (gen.); Mas (nom.), Maris (gen.); Rhœas (nom.), Rhœados (gen.).

The following remains unchanged: Sassafras.]

l—Nouns ending in the Latin nominative in *l* change, in the genitive, to *is*. Example: Phenol (nom.), Phenolis (gen.).

[*Exceptions:* Fel (nom.), Fellis (gen.); Mel (nom.), Mellis (gen.); Sumbul (nom.), Sumbuli (gen.). Some do not change the last-named. DeLorme makes this ending *is*].

o—Nouns ending in the Latin nominative in *o* (without a preceding g) change, in the genitive, to *onis*. Example: Sapo (nom.), Saponis (gen.).

[*Exceptions:* Mucilago (nom.), Mucilaginis (gen.); Ustilago (nom.), Ustilaginis (gen.). It will be observed that each of the foregoing ends in *go;* these take the genitive *inis*.

The following remain unchanged: Condurango, Kino, and Matico.]

us, um, os, on—Nouns ending in the Latin nominative in *us*, *um*, *os*, or *on*, change, in the genitive, to *i*. Examples: Hyoscyamus (nom.), Hyoscyami (gen.); Maltum (nom.), Malti (gen.); Pothos (nom.), Pothi, (gen.); Hæmatoxylon (nom.), Hæmatoxyli (gen.).

[*Exceptions:* Bos (nom.), Bovis (gen.); Erigeron (nom.), Erigerontis (gen.); Flos (nom.), Floris (gen.); Limon (nom.), Limonis (gen.); Rhus (nom.), Rhois (gen.).

The following remain unchanged: Cornus, Fructus, Haustus, Quercus, Spiritus, and Potus].

It will facilitate prescribing if it be remembered that (1) all *metals*, (2) all *glucosides*, (3) *neutral principles*, (4) all parts of the names of acids (which always, with the exception of *glaciale*, end in *um*), and all (5) names of *classes* of preparations, which end in *um* end in the genitive *i*. In the forming of the nominative *um* in glucosides and neutral principles, the latter is *added* to the English name of the preparation; thus Strophanthin, Strophanthin*um*.]

is—Nouns ending in the Latin nominative in *is* change, in the genitive, to *idis*. Example: Cantharis (nom.), Cantharidis (gen.).

[*Exceptions:* Arsenis (nom.), Arsenitis (gen.); Pulveris (nom.), Pulveritis (gen.); Phosphis, Sulphis, and other names of salts ending in *is* take the genitive *itis*; *e. g.*, Sulphis (nom.), Sulphitis (gen.).]

x—Nouns ending in the Latin nominative in *x* change, in the genitive, to *cis*. Example: Nux Vomica (nom.), Nucis Vomicæ (gen.).

e, en, ps, r—Nouns ending in the Latin nominative in *e*, *en*, *ps*, or *r*, take respectively, in the genitive, *es*, *inis*, *ipis*, or *ris*. Examples: Aloe (nom.), Aloes (gen.); Alumen (nom.), Aluminis (gen.); Adeps (nom.), Adipis (gen.); Liquor (nom.), Liquoris (gen.).

UNCHANGED.—Nouns in which no change is made—the nominative and genitive being the same, are: Æthyl* (Ethyl), Amyl*, Azederach, Berberis*, Buchu, Cannabis, Caoutchouc, Condurango, Cornus, Curare, Cusso, Digitalis, Fructus, Gambir, Haustus, Hydrastis, Jaborandi, Kino, Matico, Menthol*, Potus, Quercus, Sabal, Sago, Sassafras, Sinapis, Spiritus, Sumbul*, and Thymol*.

[*Exceptions:* *Amyl is sometimes rendered Amylis; Berberis, Berberidis; and Sumbul, Sumbuli or Sumbulis. While no change is made in the genitive in the British names, Chloral, Ethyl, Menthol, and Thymol, in the United States these are written as follows: Chloralum (nom.), Chlorali (gen.); Æthyl (nom.), Æthylis (gen.); Menthol (nom.), Mentholis (gen.); and Thymol (nom.), Thymolis (gen.).]

The following names of *classes* of preparations (see above for those ending in *a* and *um*), have the nominative and genitive as follows: Confectio (nom.), Confectionis (gen.); Mucilago (nom.), Mucilaginis (gen.); Elixir (nom.), Elixiris (gen.); Liquor (nom.), Liquoris (gen.); Mel (nom.), Mellis (gen.); Pilulæ (nom.), Pilularum (gen.); Pulver (nom.), Pulveris

(gen.); Spiritus (nom.), Spiritus (gen. [no change]); Syrupus (nom.), Syrupi (gen.); Trochisci (nom.), Trochiscorum (gen.).

All adjectives agree with their nouns in number, gender, and case. As they are usually abbreviated in writing prescriptions, it is not necessary that their terminations be learned. Moreover, they usually correspond in both English and Latin.

CONSTRUCTION OF THE PRESCRIPTION

A **Prescription** should contain at least five parts, viz: (1) Superscription; (2) inscription; (3) subscription; (4) signature; and (5) the prescriber's name.

Some add to the foregoing: (1) date; (2) name and age (if desired) of patient.

The **Superscription,** or **Heading,** consists of the symbol ℞, meaning *Recipe* or "take thou." (Some authors include in the Superscription all above the Inscription or list of ingredients. This then would include the date and patient's name, address, and age.)

The **Inscription** contains the names of the ingredients and the quantities to be used. This is usually in Latin.

The Inscription is divided into

Basis.—The principal medicinal ingredient;

Adjuvant.—That which aids the action of the basis;

Corrigent or *Corrective.*—That which modifies the action of the other ingredients.

Vehicle.—The indifferent substance or carrier, with which the other ingredients are incorporated to facilitate dispensing and administering.

The **Subscription** consists of directions to the druggist as to the kind of preparation desired and how it shall be labeled. These instructions are usually in Latin abbreviations.

The **Signature,** introduced by the sign *S.* or Sig. (*signa*=mark), comprises the instructions to the patient or nurse, directing how and when the medicine is to be taken. This is always in English.

Lastly should follow the prescriber's name in full.

Arrangement of Items in the Inscription.—The ingredients are usually arranged in the order of their importance—the chief component, then the adjuvant, corrective, and vehicle or excipient, if any. If the order of compounding is understood by the physician he may place the items in proper sequence for preparation. This, however, is the business of the pharmacist and it is not to be expected of the prescriber that he be acquainted with the details of the pharmaceutical manipulation.

Each word of the name of an ingredient should begin with a capital letter, as Tinct. Aconiti; Syr. Pruni Virg. Custom, however, varies in this respect.

Known and unmistakable and official abbreviations may be used instead of full names of drugs, but great care must be taken to have them exact and not ambiguous. Thus, these and some other abbreviations are dangerous: Aconit. may mean Aconite or Aconitine; Acid Hydroc. either Hydrochloric Acid or Hydrocyanic Acid; Hyd. Chlor. may call for Chloral Hydrate, Calomel, or Corrosive Sublimate.

Specific Directions.—In the prescription the *directions to the druggist* may be, and usually are, abbreviated, and in a Latin prescription are written in Latin.

The *directions to the patient* should always be carefully and plainly written out in full and *always in English;* and the compounder must duplicate exactly these directions upon the label placed upon the finished package. Indefinite directions should be avoided in the prescription, such as

"Use as directed" supported only by verbal directions to the patient, who at time of hearing them may have his mind perturbed by pain, or excitement, or may be afflicted with a fickle memory. Neither should the time be loosely expressed, as "Take One Teaspoonful every two or three hours," without included written reasons for the one period or other of administration.

Common Abbreviations in Prescriptions:

℞ = Take, or Take thou.
gr. = grain or grains.
Gm. = Gram or Grams (Capitalize the G to prevent confusion with gr. for grain).
ʒ = drachm or dram.
℥ = ounce.
fl ʒ (or f ʒ) = fluid drachm.
fl ℥ (or f ℥) = fluid ounce.
c. c. = cubic centimeter (mil).
mil = milliliter (c. c.)
mg. = milligram.
O = pint.
a a (ana) or āā = of each.
ss (semis) = a half.
q. s. = a sufficient quantity.
ad = to or up to (not needed after q. s.).
Sig. = Write, or mark the directions to nurse or patient.
No. = number (as number of powders required to be made).
Ft. = make. Fiat (plural, Fiant; abbreviated, ft.) is also used, meaning let it (or them) be made.
Cap. (not caps.) = capsule or capsules.
Pil (not pils). = pill or pills.
gtt. (not gtts.) = drop or drops.
M (or min) or ♏ = minim or minims (an accurately measured drop).
M. (or Misce). = Mix.
Non rep (or Ne rep). = Not to be repeated or refilled.
Q. R. (quantitum rectum). = the quantity is correct (to be used where doubt might arise as to the physician's intention). Underscoring the quantity or the whole or part of the name of an ingredient has the same significance.
Pp. (Pauperissimus) = pauper. A request to the compounder not to charge for service as the prescriber has also given his service free.
(For other abbreviations see *List of Abbreviations.*)

Illustrative Prescriptions:

1. For a Cough Syrup:

For Thomas Jones (age 60),
510 Broadway, Denver, Col.

Superscription—℞.

Inscription			
Fluidextractum Lobeliæ	fl ʒij	} Basis.	
Ammonii Chloridi	gr. xxx	} Adjuvant.	
Tinct. Opii Camphoratæ	fl ʒss.	} Corrective.	
Syr. Pruni Virg.	q. s. fl ℥iv.	} Vehicle.	

Subscription—M (or misce).

Signature—Sig. One teaspoonful every three (3) hours.

Jan. 10, 1902. John Rush, M.D.

2. For Dermatitis:

For John Alden, age 10,
Mt. Holly, Mich.

℞

Acidi Borici	ʒi
Magnesii Carbonatis	ʒiii
Talci Purificata	ʒv.

M.

Sig. Dust upon the parts as needed.

Feb. 2, 1887. John Rush, M.D.

3. For Scabies:

For Peter Parley (30),
Westwood, Ohio.

℞. Sulphuris Sublim. ℥j.
Betanaphtholis gr. xxx
Liq. Potass. Hydrox. gtt. xv
Adipis Benzoinati q. s. ℥ij.
Misce.
Sig. Apply to skin after a hot bath and friction.

Mar. 10, 1901. Benjamin Weston, M.D.

4. For Dysentery:

For John Doe (age 20),
730 Baltimore Ave.,
Cincinnati, Ohio.
Nov. 1, 1912.

℞.
Magnesium sulphate ℥i
Specific Medicine Ipecac gtt. xv
Specific Medicine Aconite gtt. x.
Water ad fl℥iv.
Mix.
Sig. One teaspoonful every (1) hour. Peter Mars, M.D.

In using Specific Medicines the *drop* is used, based on custom of bedside prescribing, rather than the minim.

5. For Full Bounding Pulse:

For Martin Luther (age 60),
Mt. Washington, N. H.
June 30, 1908.

℞. Specific Medicine Veratrum gtt. xxx.
Water q. s. fl ℥iv.
Mix.
Sig. One teaspoonful every half (½) hour.

Henry Henderson, M.D.

XII. WEIGHTS AND MEASURES.

Troy or Apothecaries' Weight.

20 grains (gr.)	=	1 scruple (℈)	=	20 grains.
3 scruples (℈)	=	1 drachm (℥)	=	60 grains.
8 drachms (℥)	=	1 ounce (℥)	=	480 grains.
12 ounces (℥)	=	1 pound (℔)	=	5760 grains.

Wine or Apothecaries' Measure.

60 minims (m)	=	1 fluid drachm (fl℥ or f℥)	=	60 minims.
8 fluid drachms (fl℥)	=	1 fluid ounce (fl℥ or f℥)	=	480 minims.
16 fluid ounces (fl℥)	=	1 pint (O)	=	7680 minims.
2 pints (O)	=	1 quart (qt.).		
4 quarts (qts.)	=	1 gallon (Cong.).		

Metric Weight.
(Approximate Equivalents).

1 Milligramme	(mg. or mgm.	= 0.001)	=	grain (gr.) 1/64
1 Centigramme	(cg. or cgm.	= 0.01)	=	grain (gr.) 1/6
1 Decigramme	(dg. or dgm.	= 0.1)	=	grain (gr.) 1 1/2
1 Gramme	**(Gm.**	= **1.**)	=	grain (gr.) 15 1/2 (or more accurately gr. 15.432)
1 Kilogramme	(Kg. or "Kilo") = 1000.		=	℔2.7 (Apoth); ℔ 2.2 (Avoir)

Apothecaries' Equivalents
(Approximate)

gr. j. (grain,) or mj (min. j. = minim)	=	.06	Gramme (Gm.).
℥j (drachm) or fl℥j (fluid drachm)	=	4.	Grammes (Gm.).
℥j (ounce)	=	31.	Grammes (Gm.).
fl℥j (fluid ounce)	=	30.	Grammes (Gm.).

Factors in Converting from One Scale to the Other.

To convert Grammes (Gm.) into grains (gr.) multiply by 15.432, or divide by 0.065.
To convert grains (gr.) into Grammes (Gm.) multiply by 0.065 (exact 0.0648).
To convert Troy ounces (℥) into Grammes (Gm.) multiply by 31.104.
To convert mils (mil or c. c.) into fluid ounces (fl ℥) multiply by 0.0338.
To convert fluid ounces (fl ℥) into mils (mil or c. c.) multiply by 29.57.

Equivalents.

1 grain (gr.) is equivalent to 0.0648 Gramme (Gm.), or 64.8 milligrams (Mgm.), or approximately 65 milligrams.
1 mil (= cubic centimeter = c. c.) is equivalent to 16.23 minims.
1 milligram (Mgm.) is equivalent to 0.01543 grains (gr.) or approximately 1/64 grain.
1 Gramme (Gm.) is equivalent to 15.4323 grains (gr.), or approximately 15 1/2 grains.
Practically the Apothecaries' ounce (℥) is equal to 30 Grammes (Gm.), (accurately, 31.104).
Practically the Apothecaries' fluid ounce (fl ℥) is equal to 30 mils (mil) or cubic centimeters (c. c.); (accurately, 29.57).
1 pint (U. S. A.) is equivalent to 473.179 mils (= c. c.).
1 Litre (L.) is equivalent to 33 fluid ounces and 391 minims.

Apothecaries' Weight and Metric Equivalents.

Fractions of a grain.

From 1/1000 of a grain to 1 grain.

1/1000 gr. = 0.00006 Gm.	1/40 gr. = 0.0016 Gm.
1/750 gr. = 0.00008 Gm.	1/32 gr. = 0.002 Gm.
1/500 gr. = 0.00013 Gm.	1/30 gr. = 0.0022 Gm.
1/400 gr. = 0.00016 Gm.	1/25 gr. = 0.0026 Gm.
1/300 gr. = 0.00022 Gm.	1/24 gr. = 0.0027 Gm.
1/250 gr. = 0.00026 Gm.	1/20 gr. = 0.0032 Gm.
1/240 gr. = 0.00027 Gm.	1/16 gr. = 0.004 Gm.
1/200 gr. = 0.00032 Gm.	1/15 gr. = 0.0043 Gm.
1/180 gr. = 0.00036 Gm.	1/12 gr. = 0.0054 Gm.
1/150 gr. = 0.00043 Gm.	1/10 gr. = 0.0065 Gm.
1/130 gr. = 0.0005 Gm.	1/8 gr. = 0.008 Gm.
1/120 gr. = 0.00054 Gm.	1/7 gr. = 0.009 Gm.
1/128 gr. = 0.0005 Gm.	1/6 gr. = 0.011 Gm.
1/100 gr. = 0.00065 Gm.	1/5 gr. = 0.013 Gm.
1/90 gr. = 0.00072 Gm.	1/4 gr. = 0.016 Gm.
1/96 gr. = 0.0007 Gm.	1/3 gr. = 0.022 Gm.
1/80 gr. = 0.00081 Gm.	1/2 gr. = 0.032 Gm.
1/75 gr. = 0.0009 Gm.	2/3 gr. = 0.043 Gm.
1/64 gr. = 0.001 Gm.	3/4 gr. = 0.049 Gm.
1/60 gr. = 0.00108 Gm.	1 gr. = 0.065 Gm.
1/50 gr. = 0.0013 Gm.	

Multiples of a grain.

From 1 grain to 1 ounce (Apoth.)

gr. 1 = 0.065 Gm.	gr. 20 = 1.3 Gm.
gr. 1 1/3 = 0.086 Gm.	gr. 24 = 1.55 Gm.
gr. 1 1/2 = 0.1 Gm.	gr. 25 = 1.620 Gm.
gr. 1 3/4 = 0.113 Gm.	gr. 30 = 1.944 Gm.
gr. 2 = 0.13 Gm.	gr. 35 = 2.27 Gm.
gr. 2 1/2 = 0.162 Gm.	gr. 40 = 2.6 Gm.
gr. 3 = 0.194 Gm.	gr. 45 = 2.92 Gm.
gr. 3 1/2 = 0.227 Gm.	gr. 50 = 3.24 Gm.
gr. 4 = 0.26 Gm.	**gr. 60(℥j) = 3.89 Gm.**
gr. 5 = 0.324 Gm.	gr. 120(℥ij) = 7.78 Gm.
gr. 6 = 0.39 Gm.	gr. 180(℥iij) = 11.65 Gm.
gr. 7 = 0.454 Gm.	gr. 240(℥ss) = 15.55 Gm.
gr. 8 = 0.52 Gm.	gr. 300 = 19.43 Gm.
gr. 8 3/4 = 0.57 Gm.	gr. 360 = 23.3 Gm.
gr. 9 = 0.583 Gm.	**gr. 480(℥j) = 31.1 Gm.**
gr. 10 = 0.65 Gm.	
gr. 12 = 0.78 Gm.	oz. 1/8 (avoir) = 3.54 Gm.
gr. 15 = 0.972 Gm.	oz. 1/4 (avoir) = 7.08 Gm.
gr. 15.4 = 1. Gm.	oz. 1/2 (avoir) = 14.17 Gm.
gr. 18 = 1.166 Gm.	oz. 1 (avoir) = 28.35 Gm.

Apothecaries' Measure and Metric Equivalents.

From 1/2 minim to 4 Fluid ounces.

Min.	1/2	=	0.03 mil (c. c.)	Min.	40	=	2.464 mil (c. c.)
Min.	1	=	0.06 mil (c. c.)	Min.	45	=	2.80 mil (c. c.)
Min.	2	=	0.12 mil (c. c.)	Min.	50	=	3.08 mil (c. c.)
Min.	3	=	0.185 mil (c. c.)	Min.	60 (f℥)	=	3.70 mil (c. c.)
Min.	4	=	0.246 mil (c. c.)	Min.	75	=	4.65 mil (c. c.)
Min.	5	=	0.308 mil (c. c.)	Min.	90	=	5.54 mil (c. c.)
Min.	6	=	0.370 mil (c. c.)	Min.	120	=	7.39 mil (c. c.)
Min.	7	=	0.431 mil (c. c.)	Min.	180	=	11.09 mil (c. c.)
Min.	8	=	0.492 mil (c. c.)	Min.	240	=	14.80 mil (c. c.)
Min.	9	=	0.554 mil (c. c.)	Min.	300	=	18.48 mil (c. c.)
Min.	10	=	0.616 mil (c. c.)	Min.	360	=	22.18 mil (c. c.)
Min.	12	=	0.74 mil (c. c.)	Min.	480 (1f℥ approx.	=	30 Gm. or mil)
Min.	15	=	0.924 mil (c. c.)		exact	=	29.57 mil (c. c.)
Min.	20	=	1.232 mil (c. c.)	f℥ij		=	59.15 mil (c. c.)
Min.	25	=	1.54 mil (c. c.)	f℥iij		=	88.72 mil (c. c.)
Min.	30	=	1.85 mil (c. c.)	f℥iv		=	118.29 mil (c. c.)
Min.	35	=	2.156 mil (c. c.)				

Approximate Equivalents of Metric Measures of Mass. *

(The unit of Mass in the Metric System is the Gramme.)

1 mgm. (miligram)	= 1/64 gr. (grain).	75 cgm.	= 11 1/2 gr.
2 mgm.	= 1/33 gr.	**1 Gm. (Gramme)**	= **15 1/2 (15.432) gr.**
3 mgm.	= 1/21 gr.	2 Gm.	= 30 7/8 gr.
4 mgm.	= 1/16 gr.	3 Gm.	= 46 1/4 gr.
5 mgm.	= 1/13 gr.	4 Gm.	= 61 3/4 gr.
6.5 mgm.	= 1/10 gr.	5 Gm.	= 77 1/6 gr.
8/mgm..	= 1/8 gr.	7.5 Gm.	= 115 3/4 gr.
1 cgm.(centigram)	= **1/6 gr.**	10 Gm.	= 154 1/3 gr.
2 cgm.	= 1/3 gr.	15 Gm.	= 231 1/2 gr.
3 cgm.	= 1/2 gr.	20 Gm.	= 308 3/5 gr.
5 cgm.	= 3/4 gr.	30 Gm.	= 1 ℥, 25 1/2 gr.
6.5 cgm.	= **1 gr.**	40 Gm.	= 1 ℥, 179 4/5 gr.
10 cgm.	= 1 1/2 gr.	75 Gm.	= 2 ℥, 282 1/2 gr.
15 cgm.	= 2 1/4 gr.	100 Gm.	= 3 ℥, 230 3/4 gr.
20 cgm.	= 3 gr.	150 Gm.	= 5 ℥, 127 1/2 gr.
26 cgm.	= 4 gr.	250 Gm.	= 8 ℥, 358 gr.
30 cgm.	= 4 1/2 gr.	500 Gm.	= 1 lb., 1 ℥, 278 gr.
40 cgm.	= 6 1/4 gr.	750 Gm.	= 1 lb., 10 ℥, 200 gr.
50 cgm.	= 7 3/4 gr.	**1 Kgm. (kilogram)**	= **2 lbs., 3 ℥, 120 gr.**

*From Excerpta Therapeutica (By permission of Burroughs, Wellcome & Co.)

Approximate Equivalents of Metric Measures of Capacity.*

(The unit, of measure of capacity in the Metric System is the *Litre*).

1 mil. = (c. c.) = 16(16.23)minims(min.)		20 mil. = (c. c.) = 5 f℥, 25 min.	
2 mil. = (c. c.) = 32 1/2 min.		25 mil. = (c. c.) = 6 f℥, 46 min.	
3 mil. = (c. c.) = 48 3/4 min.		30 mil. = (c. c.) = 1 f℥, 7 min.	
4 mil. = (c. c.) = 1 f℥, 5 min.		40 mil. = (c. c.) = 1 f℥, 2 f℥, 49 min.	
5 mil. = (c. c.) = 1 f℥, 21 min.		50 mil. = (c. c.) = 1 f℥, 5 f℥, 32 min.	
6 mil. = (c. c.) = 1 f℥, 37 min.		75 mil. = (c. c.) = 2 f℥, 4 f℥, 17 min.	
7 mil. = (c. c.) = 1 f℥, 54 min.		100 mil. = (c. c.) = 3 f℥, 3 f℥, 3 min.	
8 mil. = (c. c.) = 2 f℥, 10 min.		125 mil. = (c. c.) = 4 f℥, 1 f℥, 49 min.	
9 mil. = (c. c.) = 2 f℥, 26 min.		150 mil. = (c. c.) = 5 f℥, 0 f℥, 35 min.	
10 mil. = (c. c.) = 2 f℥, 42 min.		200 mil. = (c. c.) = 6 f℥, 6 f℥, 6 min.	
12.5 mil. = (c. c.) = 3 f℥, 23 min.		300 mil. = (c. c.) = 10 f℥, 1 f℥, 9 min.	
15 mil. = (c. c.) = 4 f℥, 4 min.		500 mil. = (c. c.) = 16 f℥, 7 f℥, 15 min.	
		1 litre	**= 33 f℥, 6 f℥, 31 min.**

*Adapted from Excerpta Therapeutica (By permission of Burroughs, Wellcome & Co.)

Domestic or Popular Measures.
(Approximate)

A teaspoonful is approximately 1 fluid drachm (f℥j).
A desertspoonful is approximately 2 fluidrachms (f℥ij).
A tablespoonful is approximately 3 1/2 fluidrachms (f℥iijss) to 1/2 fluidounce (f℥ss).
A wineglass is approximately 2 fluidounces (f℥ij).
A teacupful is approximately 3 1/2 to 5 fluidounces (f℥iijss to f℥v).
The average cup holds about 4 fluidounces (f℥iv).

A breakfast cupful is approximately 8 fluidounces (fℨviij).
A tumblerful is approximately 8 fluidounces (fℨviij).
A half-glassful is approximately 4 fluidounces (fℨiv).
(The latter is usually employed in the bedside administration of Eclectic medicines.)

Drop.—A drop is irregular in size depending upon the size or form of the *edge* of the container, and being of greater size if of thick material dropped from a wide-mouthed bottle, and, reversely, smaller when thin and dropped from a thin-lipped bottle.

The abbreviation for both drop and drops is gtt. (not gtts.).

Minim.—The Minim is a true drop accurately measured in a minim graduate. The abbreviation for both minim and minims is M, m, or min.

XIII. PERCENTAGE SOLUTIONS AND DISPENSING TABLES.

TABLE FOR MAKING SOLUTIONS*

"The following table gives the amounts of material to be used with one fluidounce and one pint of distilled water, respectively. If a smaller or larger quantity of solution is desired, increase or decrease the amount of material given in the table accordingly. Many tables of this kind attempt to state the weight of material required to make a definite volume of solution but, inasmuch as the amount so required varies with the density of the material to be dissolved, such a table obviously is incorrect, except for material of the particular density on which it is based.

"The amount of substance required for a definite volume of a particular solvent, to make a certain strength of solution, is the same for any material and, therefore, no correction for density is necessary for the figures given in this table. The material dissolved will add approximately one minim of volume for every two grains of substance.

"The quantities given below are based on the weight of distilled water at 25°C" (77°F.)."

Strength of Solution	Amount to be dissolved in: 1 Fl. Ounce of Distilled Water	1 Pint of Distilled Water
1:5000	.091 grs.	1.45 grs.
1:2000	.227 "	3.64 "
1:1000	.455 "	7.28 "
1:500	.911 "	14.57 "
1:200	2.28 "	36.5 "
1 per cent	4.59 "	73.5 "
2 " "	9.28 "	148.5 "
3 " "	14.06 "	225. "
4 " "	18.94 "	303. "
5 " "	23.9 "	383. "
6 " "	29. "	1 av. oz. 27. "
8 " "	39.5 "	1 " " 195. "
10 " "	50.5 "	1 " " 371. "
12 1/2 " "	64.9 "	2 " ozs. 164. "
15 " "	80.2 "	2 " " 408. "
16 2/3 " "	90.9 "	3 " " 142. "
20 " "	113.6 "	4 " " 68. "
25 " "	151.5 "	5 " " 237. "
30 " "	194.8 "	7 " " 55. "
33 1/3 " "	227.3 "	8 " " 137. "
35 " "	245. "	8 " " 416. "
40 " "	303. "	11 " " 36. "
45 " "	372. "	13 " " 263. "
50 " "	1 av. oz. 17. "	16 " " 273. "

*(From "Handbook of Pharmacy and Therapeutics, Lilly," by permission of Eli Lilly & Co.)

Percentage Table for Ointments.
(In round numbers.)

5	grains	to	1	ounce	of	base	= 1%.
10	"	"	"	"	"	"	= 2%.
15	"	"	"	"	"	"	= 3%.
20	"	"	"	"	"	"	= 4%.
25	"	"	"	"	"	"	= 5%.
30	"	"	"	"	"	"	= 6%.
40	"	"	"	"	"	"	= 8%.
50	"	"	"	"	"	"	= 10%.

DRUG CONTENT IN MINIMS OF EACH FLUID DRACHM DOSE OF MEDICINE.

Fluidounces of Vehicle	1 Minim of Medicine	5 Minims	10 Minims	15 Minims	20 Minims	30 Minims	60 Minims
1(= 8 fluid drachms)	⅛ Minim	⅝ Minim	1¼ Minim	1⅞ Minim	2½ Minim	3¾ Minim	7½ Minim
2(=16 " ")	1/16 "	5/16 "	⅝ "	15/16 "	1¼ "	1⅞ "	3¾ "
3(=24 " ")	1/24 "	5/24 "	5/12 "	⅝ "	5/6 "	1¼ "	2½ "
4(=32 " ")	1/32 "	5/32 "	5/16 "	15/32 "	⅝ "	15/16 "	1⅞ "
6(=48 " ")	1/48 "	5/48 "	5/24 "	5/16 "	5/12 "	⅝ "	1¼ "
8(=64 " ")	1/64 "	5/64 "	5/32 "	15/64 "	5/16 "	15/32 "	15/16 "

LENGTH OF TIME A QUANTITY OF MEDICINE WILL LAST IF ADMINISTERED IN TEASPOONFUL (DRACHM) DOSES, AT INTERVALS STATED, DURING 24 HOURS.*

Fluid-ounces	Every 1 hour	Every 2 hours	Every 3 hours	Every 4 hours	Every 6 hours	Every 8 hours	Remarks
1	8 hours (⅓ day)	16 hours (⅔ day)	24 hours (1 day)	32 hours (1⅓ days)	48 hours (2 days)	64 hours (2⅔ days)	*If administered during 16 hours of the day, omitting 8 of the night hours, the quantities of medicines will last *one third longer*. If administered for but 12 hours out of the twenty-four, the medicine will last *twice as long*.
2	16 hours (⅔ day)	32 hours (1⅓ days)	48 hours (2 days)	64 hours (2⅔ days)	96 hours (4 days)	128 hours (5⅓ days)	
3	24 hours (1 day)	48 hours (2 days)	72 hours (3 days)	96 hours (4 days)	144 hours (6 days)	192 hours (8 days)	
4	32 hours (1⅓ days)	64 hours (2⅔ days)	96 hours (4 days)	128 hours (5⅓ days)	192 hours (8 days)	256 hours (10⅔ days)	
6	48 hours (2 days)	96 hours (4 days)	144 hours (6 days)	192 hours (8 days)	288 hours (12 days)	384 hours (16 days)	
8	64 hours (2⅔ days)	128 hours (5⅓ days)	192 hours (8 days)	256 hours (10⅔ days)	384 hours (16 days)	512 hours (21⅓ days)	

XIV. DEFINITIONS OF THERAPEUTIC TERMS.

Abortient. Same as Abortifacient, which see.

Abortifacient. A drug which causes expulsion of the fetus (abortion).

Abortive. Same as Abortifacient, which see.

Absorbent. A drug that promotes absorption.

Absorbifacient. Same as Absorbent, which see.

Abstergent. A cleansing or purifying medicine.

Acidifier. A drug which imparts acidity to the fluids, especially to the blood (more correctly lessens alkalinity here), and to the urine.

Alkalinizer. A drug which increases alkalinity of the body fluids, especially the blood, or the urine.

Alterative. A drug which causes a favorable change or alteration in the processes of nutrition and repair, probably through some unknown way improving metabolism.

Analgesic. Same as Anodyne. An agent that relieves pain.

Anaphrodisiac. A drug that lessens sexual desire or depresses sexual power.

Anesthetic (anæsthetic). An agent which temporarily abolishes sensation, producing insensibility to contact and pain. There are local and general anesthetics, the latter being administered by inhalation.

Anhydrotic. An agent which prevents or checks excessive sweating (same as Antihydrotic).

Anodyne. An agent that relieves pain, but does not necessarily produce unconsciousness.

Antacid. An agent that will correct acidity by neutralization, chiefly acidity of the stomach.

Antagonist. An agent which opposes the action of some other medicine, and especially the toxic effects of alkaloidal poisons.

Anthelmintic. A remedy against intestinal worms.

Antiarthritic. A remedy employed to subdue inflammation of the joints.

Antidote. A remedy to counteract poisons. It is (*a*) chemical, destroying the poison; (*b*) mechanical, preventing absorption; (*c*) physiologic, opposing the effect upon the system after absorption of the poison.

Antiemetic. A remedy that prevents or stops vomiting (emesis).

Antigalactagogue. An agent that diminishes the secretion of milk.

Antihemorrhagic. A remedy which arrests or controls bleeding (hemorrhage).

Antihydrotic. A remedy to prevent or control excessive sweating (same as Anhydrotic).

Antilithic. An agent which is believed to prevent the formation of stone, or calculi.

Antimalarial. A remedy against, or relieving in, malarial infection.

Antimiasmatic. A remedy against miasmatic disorders (miasm—noxious exhalation or effluvium); an unsatisfactory term.

Antimicrobic. A drug checking the development or growth of microbes.

Antiperiodic. An agent that diminishes or arrests the periodicity of malarial attacks; in general, an antimalarial, which see.

Antiphagocytic. Opposing or counteracting the action of phagocytes (phagocytosis).

Antiphlogistic. An agent which counteracts inflammation, with fever.

Antipyretic. An agent which reduces the temperature of fevers.

Antirheumatic. An agent employed to prevent or to relieve in rheumatic infection (rheumatism).

Antiscorbutic. A remedy that prevents or corrects scurvy.

Antiseptic. An agent which prevents the growth of microbes and cripples their activity while in contact with them. An agent that opposes or prevents sepsis.

Antisialagogue. An agent that prevents or diminishes the flow of saliva.

Antisialic. An agent that prevents or diminishes the flow of saliva (same as Antisialagogue, which see).

Antispasmodic. An agent that will prevent and relieve spasm of the voluntary or involuntary muscles.

Antisudorific. An agent to prevent or relieve excessive sweating.

Antisyphilitic. A remedy to prevent or to relieve in syphilitic infection (syphilis).

Antitetanic. An agent to prevent or relieve tetanus.

Antithermic. An agent to reduce body temperature.

Antitoxin. Any defensive protein acting as a neutralizer of poison. Most therapeutic antitoxins are derived from the blood-serum of animals in which a specific disease has been purposely developed. *Examples*: Antidiphtheric and Antitetanic Serums.

Antitussive. A remedy to relieve or prevent cough.

Antizymotic. An agent which prevents or arrests the process of fermentation.

Aperient. A gentle and nonirritating purgative causing but little increase of peristalsis and producing soft feces.

Aphrodisiac. An agent which increases sexual desire, or increases sexual power.

Astringent. An agent which, by acting upon the albumen of tissues, causes condensation and contraction, and restrains discharges.

Bitter. An agent which increases the tone and activity of the gastric mucosa, thereby improving the appetite.

Cardiac. An agent which stimulates and tones the heart; also a cordial or restorative.

Cardiant. An agent which acts upon the heart, either stimulating or depressing its action.

Carminative. An agent that prevents or relieves flatulence and thereby allays pain.

Cathartic. An agent that hastens and increases evacuation of the bowels. Same as Purgative, which see.

Caustic. An agent having an escharotic or corrosive action on living tissue. (Used interchangeably with Cauterant.)

Cauterant. An agent which has a corrosive destructive action upon living tissue

Cholagogue. A medicine which stimulates and increases the flow of bile.

Corrigent. An agent which favorably modifies the action of powerful or harsh drugs; a correctant or corrective.

Corrosive. An agent destructive to tissue.

Counterirritant. An agent which, by inducing local irritation or hyperæmia, acts as a derivative to relieve irritation, inflammation or pain in some part remote from that to which it is applied.

Cycloplegic. An agent which paralyzes the ciliary muscle, resulting in relaxation of accommodation (cycloplegia).

Dacryagogue. An agent which causes a flow of tears.

Deliriant. A drug which may produce delirium. (Same as Delirifacient, which see.)

Delirifacient. A drug which may cause delirium. (Same as Deliriant, which see.)

Demulcent. A bland and soothing oily or mucilaginous application or medicine to relieve irritation of inflamed or abraded surfaces, usually intended for use upon the mucosa. (See also Emollient.)

Deobstruent. A medicine that removes obstructions.

Deodorant. A substance that masks, removes, or destroys odor.

Depilatory. A substance that removes or destroys hair.

Depressant. An agent that will depress function and vital energies by causing relaxation of muscular tissues and sweating; a medicine that depresses any function.

Depresso-motor. An agent which depresses or diminishes motor activity.

Depurant. A purifying medicine; *e. g.*, a renal depurant.

Detergent. A cleansing or purifying medicine.

Diaphoretic. An agent that will stimulate and cause increased perspiration: a sedative diaphoretic is one that acts by dilation of the vessels of the skin, as when induced by heart sedatives or emetics.

Digestant. An agent, which digests, or assists the digestion of food.

Diluent. An agent that dilutes the fluids of the body and renders the excretions less irritant.

Discutient. A medicine which causes a disappearance or scattering of a local tumefaction or inflammation.

Disinfectant. An agent that prevents, or frees from infection, acting chiefly by destroying pathogenic germs or rendering organic ferments inactive.

Diuretic. A drug which causes and increases secretion and flow of urine.

Drastic. A harsh purgative usually causing pain, tormina or tenesmus, and causing repeated evacuations.

Ecbolic. An agent which excites and accelerates parturition.

Eliminant. A drug which causes evacuations; also one by which soluble compounds are formed of insoluble substances in the body, thus facilitating their removal by the excretory organs.

Eliminator. Same as Eliminant, which see.

Emmenagogue. An agent that stimulates menstruation.

Emetic. An agent that causes vomiting (emesis).

Emollient. A medicine or agent which softens or soothes the skin, or soothes the mucosa, when irritated. (Compare Demulcent.)

Epispastic. An agent which causes blistering (vesication).

Errhine. An agent which excites nasal secretion and sneezing.

Escharotic. A caustic or corrosive agent capable of producing an eschar or slough.

Excitant. A medicine which causes excitation of the vital functions, as of the nervous (nervous excitant), muscular (motor excitant), circulatory (vaso-motor and cardiac excitants) systems.

Excito-motor. An agent which excites to increased muscular activity.

Exhilarant. An agent which excites or elevates the psychic function.

Expectorant. An agent which promotes expectoration; *i. e.*, the ejection, by spitting, of fluids secreted by the broncho-pulmonic mucosa. Stimulant expectorants excite in atony while sedative expectorants allay irritation, both facilitating the expulsion of sputum.

Febrifuge. An agent that will reduce temperature in fevers.

Galactagogue. An agent that stimulates the secretion or promotes the flow of milk.

Galactophyge. An agent that diminishes or arrests the flow of milk.

Germicide. An agent destructive to germs or micro-organisms.

Hematic (hæmatic). An agent which improves the quality of the blood.

Hematinic (hæmatinic). An agent which improves the quality of the blood.

Hepatic. A drug that stimulates the function of the liver.

Hydragogue. An agent that causes watery discharge; especially a purge which produces watery catharsis.

Hypnotic. A medicine which induces sleep simulating that of normal slumber. Some pain relievers are also hypnotic, but true hypnotics only cause sleep.

Irritant. An agent which, when applied locally, excites hyperæmia or inflammation.

Laxative. A medicine causing a mild and painless evacuation of the bowels.

Lenitive. A medicine which has the soothing action of a demulcent on the internal membranes.

Lithontriptic. A medicine supposed to be capable of dissolving calculi within the body.

Miotic (myotic). A medicine which causes the pupil to contract (miosis).

Motor depressant. A drug which depresses or restrains motor or muscular activity.

Motor-excitant. A drug which excites to increased motor or muscular activity.

Mydriatic. An agent which dilates the pupil (mydriasis).

Myotic (miotic). An agent which causes contraction of the pupil (myosis).

Narco-hypnotic. An agent that not only causes sleep, but if given in larger doses induces narcosis. (See Narcotic.)

Narcotic. A drug that will induce stuporous sleep, at the same time relieving pain and abolishing consciousness.

Nutriant (nutrient). A medicine which affects the nutritive process, or metabolic changes in the body; one that supplies material for tissue building.

Oxytocic. A drug which accelerates or hastens the process of delivery in childbirth.

Paralyzant. A drug that causes temporary functional paralysis of some part of the body.

Parasiticide. An agent which destroys parasites.

Parturifacient. A medicine that induces or facilitates childbirth.

Partus præparator. An agent that strengthens preparatory to labor.

Protective. An agent that protects mechanically by covering or coating the skin or a lesion of the surface.

Purgative. A cathartic; an agent that will cause evacuation of the contents of the bowels.

Purge. A purgative medicine, or a dose of the same; to purge.

Pustulant. An agent that attacks isolated areas of the skin, as the sudoriferous glands, causing pustules (pustulation).

Reconstructive. An agent that, through furnishing needed medicinal substances, restores strength and integrity to the body.

Refrigerant. An agent which imparts a cooling sensation to the mucosa and allays thirst; externally it cools by evaporation.

Resinoids. A class of preparations resembling somewhat the resins, and being a mixture of resins with other substances. A name especially applied to a group of substances obtained by precipitating alcoholic preparations containing resins, with water. The so-called Eclectic resinoids were of this class, all of them, with the exception of podophyllin, iridin, and macrotyn, being of little value.

Resolvent. An agent that is supposed to promote resolution, or dissipation of pathologic growths.

Resorbent. An agent that promotes the removal of excreted material, as exudates, etc.

Restorative. An agent that restores to consciousness, or one that aids in restoring tone, function, vigor, or health.

Revulsive. An agent which, by producing a localized determination of blood, reduces other blood engorged areas.

Roborant. An agent that by supplying needed material or food to the tissues, imparts increased strength.

Rubefacient. An agent which, when locally applied, reddens the skin.

Salivant. Same as Salivator, which see.

Salivator. An agent which salivates or causes an excessive flow of saliva.

Sedative. A drug that allays or calms excitement.

Sedative, Arterial or Special. An Eclectic term for Aconite, Veratrum, and Gelsemium, when given in small doses. (See Aconitum or Gelsemium.)

Sialagogue. An agent that promotes an increased flow of saliva.

Somnifacient. An agent which induces sleep; a hypnotic.

Specific. An agent supposed to have a selective curative action in a special disease, or in some phases of disease.

Sternutatory. An agent that excites sneezing.

Stimulant. An agent that excites functional activity. A term often loosely applied. Stimulants are *diffusible* when they excite the circulation and general functions of the body; *nervous*, when they act chiefly upon the nerve centers; *hepatic*, when they arouse the functions of the liver; *cardiac*, when they increase the heart's action; *gastric*, when they quicken digestion; *respiratory*, when they increase respiratory movements; etc. Also applied to medicines in which the action of the contained ethyl alcohol is desired.

Styptic. A local agent that, through a strongly astringent action, will arrest bleeding.

Subculoyds. Non-irritating sterile preparations of plant drugs intended for hypodermatic medication. (See *Subculoyd Lobelia.*)

Sudorific. An agent that will cause active or droplet perspiration, a more intense action than that of the ordinary diaphoretic.

Synergist. A drug which has a similar effect upon tissue or function to that of some other drug. Synergists usually act harmoniously with such other drugs.

Tæniacide (tænicide). An agent that will kill and expel the tapeworm.

Tænifuge (Tæniafuge). An agent that will expel the tapeworm.

Tonic. An agent which tends to produce or restore normal tone to the functions and tissues of the body.

Vaso-constrictor. A drug which causes constriction of blood vessels.

Vaso-depressant. An agent that, by acting on the vaso-motor or nervous system, will decrease arterial pressure and relax the blood vessels.

Vaso-dilator. A drug which causes dilation of blood vessels.

Vaso-stimulant. An agent which, by acting upon the vasomotor nervous system, will increase arterial tension and thereby constrict the blood vessels.

Vermicide. A medicine that will kill intestinal worms.

Vermifuge. A medicine that will cause the expulsion of intestinal worms.

Vesicant. A drug which causes blistering (vesication).

XV. ABBREVIATIONS, WORDS, AND PHRASES.

Used in Prescriptions, Pharmacy, and Medicine.

A.—Ana, of each.
aa.—ana, of each.
Abs. febr.—Absente febre, while the fever is off.
A. C.—Ante cibum, before meals.
Ad.—To, up to.
Adde.—Add.
Adst. feb.—Adstante febre, while the fever is on.
Agit.—Agita, shake.
Alb.—Albus, white.
Alt.—Alter, the other.
Alt. noct.—Alternis noctibus. Every other night.
Alternis horis.—Every other or second hour.
A. M.—Ante meridiem, before noon.
Am. or Amer. Disp.—American Dispensatory.
Amplus —Large
Ana.—Of each.
Ante.—Before
Aq. dest.—Aqua destillata, distilled water.
Aq. bull.—Aqua bulliens, boiling water.
Aq. comm.—Aqua communis, common water or tap water.
Aq.—Aqua, water.
Aq. ferv.—Aqua fervens, hot water.
Aq. fluv.—Aqua fluviatilis, river or flowing water.
Aq. font.—Aqua fontalis, spring-water.
Aq. mar.—Aqua marina, sea or salt water.
Aq. niv.—Aqua nivalis, snow water.
Aq. pluv.—Aqua pluviatilis, rain water.
Aq. pur.—Aqua pura, pure water.
b. i. d.—bis in die, twice a day.
Ben—Bene, well.
Bib.—Bibat, let him drink.
Bis—Twice.
Bis in d.—Bis in die, twice a day.
Bol.—Bolus, a large pill.
Bonus—Good.
Bulliat, bulliant—Let it or them boil.
Bulliens—Boiling.
Bullio—To boil.
c.—cum, with.
c.c.—Cubic Centimeter.
Caut.—Cautè, cautiously.
Cap.—Capsula, capsule.
Cap. or Capt.—Capiat, let (patient) take.
Cat.—Cataplasma, a poultice.
Chart.—Chartula, paper.
Chart.—Chartula, a small paper.
Cib.—cibus, food.
Coch. amp.—Cochleare amplum, a tablespoonful.
Coch. med.—Cochleare medium, a dessertspoonful.
Coch. par.—Cochleare parvum, a teaspoonful.
Cochl. j.—Cochlear or cochleare, a spoonful.
Coct.—Coctio, boiling.
Col.—Cola, strain.
Colent.—Colentur, let them be strained.
Colet.—Coletur, let it be strained.

Coll.—Collyrium, an eye wash.
Collutor —Collutorium, a mouth wash
Collyr.—Collyrium, an eye-water.
Comp.—Compositus, compounded
Conf.—Confectio, a confection.
Cong.—Congius, a gallon.
Coq.—Coque, boil
Cort.—Cortex, the bark.
Cyath. j. —A glassful
Cyath. vinar.—Cyathus vinarius, a wineglassful
D. in p. aeq —Dividatur in partes equales. Let it be divided into equal parts.
D or Dos.—Dosis, a dose.
Da—Give.
Dec.—Decanta, pour off.
Decem.—Ten.
Decoct.—Decoctio, Decoctum, a decoction.
Decub.—Decubitus, lying down.
Die—In a day
Dieb alt.—Diebus alternis, every other or second day
Dieb tert —Diebus tertius. Every third day
Dies—A day
Dil.—Dilutum, diluted
Dil.—Dilue Dilute (thou) or dilutus, diluted
Div.—Divide, divide.
Dividend s —To be divided.
Dolor. Dolores —Pain, pains
Dr or Drm.—Drachma, a drachm.
Effund —Effunde, pour out.
Elect.—An electuary
Emp —Emplastrum, a plaster
Enema. Enemata.—Enema, or enemas clysters).
et —And
Ex or Ext —Extractum, an extract
Exhil —Exhilarans
Ext. —Extractum, an extract
Exten —Extensus, spread
f or fl ʒ.—Fluid drachma, a fluid drachm
f or fl ℥ —Fluid uncia, a fluid ounce
F. S. A —Fiat secundum artem, let it be prepared according to the rules of the art
F. s. a. r —Fiat secundum artis regulas. Let it be made according to the rules of art
F ft —Fac, fiat, fiant, make or let there be made
Farina Flour or meal
Febris—Fever
Filt.—Filtra, filter.
Flav.—Flavus, flavor
Flo. or Flos.—Flores, flowers.
Fol.—Folius, a leaf
Fotus—A fomentation.
Fruct.—Fructus, a fruit
Ft.—Fiat, make.
Ft. cat —Fiat cataplasma, make a poultice or cataplasm
Ft. emuls.—Fiat emulsio, make an emulsion.
Ft. Garg —Fiat Gargarisma, make a gargle.
Ft. Mass.—Fiat Massa, make a mass.
Ft. mist.—Fiat mistura, make a mixture.
Ft. Pulv.—Fiat pulvis or pulveres, make a powder or powders.
Ft. Solut.—Fiat solutio, make a solution.
Ft. Suppos.—Fiat suppositorium, make a suppository or suppositories.
Ft. ung.—Fiat unguentum, make an ointment.
Garg.—Gargarisma, a gargle.
Gm.—A gram.
gr.—Granum, a grain.
Gtt.—Gutta, guttæ, drop or drops.
Gutt.—Gutta, a drop or drops.
H.—Hora, an hour.
H. decub. or H. d.—Hora decubitus, at the hour of going to bed; at bed time.
H. s. or Hor. som.—Hora somnis, at the hour of rest; just before time of sleep.
Haust.—Haustus, a draught.
Herb.—Herba, an herb.
Idem —The same.
Infus.—Infusio, infusum, infuse; an infusion.
In—In.
Ind. or In dies.—Indiès, every day, daily, from day to day.
Infunde—Infuse.
Inject—Injectio, an injection.
Jus.—Jusculum, a broth;
Jus. ovillum, mutton broth;
Jus. bovinum, beef broth.
Lac.—Milk.
℔.—Libra, a pound.
Liq.—Liquor, liquor.
Lot.—Lotio, a lotion.
M.—Minimum, a minim, or accurately measured drop.
M. F. Mist.—Misce fiat mistura, mix to form a liquid mixture.
M. F. P.—Misce fiat pulvis, mix to form a powder.
M. F. Pil.—Misce fiant pilulæ, mix to form pills.
M. S. D.—Misce, signa, da, mix the medicine, and deliver it, with the requisite instruction, in writing, to the patient (or nurse).
Mac.—Macera, macerate.
Mane.—In the morning.
Mass. —Massa, a mass.
Mil.—Milliliter or cubic centimeter. (A new word, not an abbreviation, derived from first syllable of milliliter, and designed to displace the term cubic centimeter.)
Min.—Minimum, a minim, or accurately measured drop.
Mic pan.—Mica panis, crumb of bread
Mist.—Mistura, a mixture.
Mitte —Send.
Mucil.—Mucilago, mucilage.
N —Nocte, at night.
N. F. or Nat. Form.—National Formulary.
Ne rep.—Ne repetatur, not to be refilled.
No.—Numerus, number.
No. 1, 2, 3, etc.—Number of pieces or parts, etc. (also written j, ij, iij, iv, v).
Noman.—Nocte maneque, night and morning.
Non—Not.
Non rep.—Non repetatur, do not repeat.
O. or Oct.—Octarius, a pint.
o. d.—omni die, daily.
Omn. hor.—Omni hora, every hour.
Omn. man.—Omni manè, every morning.
Omn. n.—Omni nocte, every night.
Omnis—All.
Ovum—An egg.
P Æ.—Partes equales, equal parts
p. c.—post cibum, after meals.
P. P.—Poor patient (a request to the druggist to make lowest price possible; the doctor should do likewise), to be placed at top or bottom of prescription.
p. r. n.—pro re nata, when required; occasionally, or as the symptoms may require.
Pars, partis—A part.
Parvus—A little.
Ph.—Pharmacopœia, a pharmacopœia.
Pil.—Pilula, a pill.
Pone—Behind.
Pone aurum.—Behind the ear.
Pot.—Potus, drink.
Pot.—Poteo, a potion.
Pulv.—Pulvis, a powder; also pulvis factis, powdered.
q. h.—quaque hora, every hour.
q. 2 h.—every 2 hours.
q. 3 h.—every 3 hours.
q. 4 h.—every 4 hours.
Q. l.—Quantum libet, as much as you like.
Q. q. or quaq.—Quaque, each or every one.
Q. s.—Quantum sufficiat, sufficient.
q. s.—quantam sufficiat, as much as may be required.
Q. v.—Quantum volueris, as much as you like.
Quater—Four times.
Quartus—Fourth.
Quinque—Five,
Quintus—Fifth.
℞.—Recipe, take or take thou.
Rad.—Radix, the root.
Rept. or repet.—Repetatur (repetantur), let it (or them) be repeated; and repetendus, to be repeated.
S.—Signa, write thou (directions to patient or nurse).
s.—sine, without.
S. a.—Secundum artem. According to art; that is, to use your own ingenuity to do it in the most proper and scientific way.
S. o. s.—Si opus sit, when required.
Sig —Signa (or signetur), Write thou (directions to patient or nurse) or let it be marked, directed or written upon.
Siccus—Dry or dried.
Sex—Six
Sextus—Sixth.
Sesqui —Sesqui, one and a half.
Septem—Seven.
Septimus—Seventh.
Sol—Solve, dissolve.
Spissus—Thick.
Spt —Spiritus, spirit.
Ss.—Semis, a half.
Stat —Statim, at once.
Subtep.—Subtepidus, a little warm; lukewarm.
Succus—Juice or sap.
Syr.—Syrupus, syrup.
T. d.—Ter die, three times a day.
t. i. d.—ter in die, three times a day.
Tabel.—Tabellæ, tabulæ, lozenges.
Ter.—Tere, terendus, rub; to be rubbed.
Ter—Three times.
Tertius—Third.
Tinct.—Tinctura, a tincture.
Tres—Three.
Trit.—Tritura, Triturate.
Tritus—Ground.
U. S. P —United States Pharmacopœia.
V. or Vel—Vel, or.
V. o. s.—Vitello ovi solutum, dissolved in the yolk of an egg.
Vertus—true, real, genuine.
Vesp.—Vespere, in the evening.
Vigesimus —The twentieth.
Viginti—Twenty
Vitell. ovi—The yolk of an egg.
Vitellus.—The yolk of the egg.
Vitrum.—A glass.
Vehiculum.—A vehicle.
Ubi—Where, whenever.
Una—Together.
Unguilla—An ointment box.
Ut—As, that, so that; in the same manner as.
Ut dict.—Ut dictum. As directed.
ʒ.—Drachma, a drachm or dram.
℥.—Uncia, an ounce.
℈.—Scrupulus, a scruple (or 20 grains).
4 i. d.—Four times a day.

XVI. PHARMACEUTICAL PREPARATIONS, WITH DOSES.

(List of Fluidextracts, Tinctures, Syrups, Elixirs, Wines, and Powders, not systematically mentioned in the articles on individual drugs. The extremely energetic are in **heavy-face type**; those of slightly lesser strength in *italics;* the balance in ordinary type.)

FLUIDEXTRACTS.

Aconite	1/2	to	2	minims.
Adonis	1	to	5	"
Aletris	5	to	60	"
Alstonia constricta	5	to	40	"
Alstonia scholaris	5	to	60	"
Angelica	5	to	60	"
Apocynum	1	to	20	"
Aralia	5	to	60	"
Aromatic	1	to	20	"
Aspidosperma (Quebracho)	5	to	60	"
Belladonna Leaves	1/5	to	2	"
Belladonna Root	1/5	to	2	"
Berberis aquifolium	5	to	40	"
Bitter Orange Peel	5	to	30	"
Black Cohosh	1	to	30	"
Black Haw	5	to	60	"
Bloodroot	1	to	5	"
Blue Flag	1	to	15	"
Buchu	5	to	60	"
Calamus	5	to	40	"
Calendula	5	to	60	"
Calumba	5	to	30	"
Canada Snake Root	5	to	60	"
Capsicum	1/2	to	2	"
Cascara Sagrada	20	to	60	"
Celery Seed	20	to	60	"
Chestnut Leaves	60	to	120	"
Chionanthus	5	to	60	"
Cinchona	5	to	60	"
Cinchona (Red)	5	to	60	"
Colchicum Root	1	to	8	"
Colchicum Seed	1	to	8	"
Colocynth	1	to	4	"
Condurango	5	to	60	"
Conium Fruit	1	to	5	"
Corn Silk	30	to	120	"
Cornus	5	to	60	"
Corydalis	10	to	60	"
Cotton Root	20	to	60	"
Cubeb	5	to	40	"
Digitalis	1	to	2	"
Dioscorea	5	to	60	"
Echinacea	5	to	30	"
Elecampane	10	to	60	"
Ergot	15	to	120	"
Eriodictyon	5	to	60	"
Eucalyptus	5	to	60	"
Euonymus	5	to	30	"
Eupatorium	5	to	60	"
Euphorbia pilulifera	10	to	60	"
Frangula	5	to	60	"
Fucus	10	to	60	"
Gelsemium	1	to	5	"
Gentian Compound (Eclectic)	30	to	60	"
Geranium	5	to	120	"
Glycyrrhiza	10	to	120	"
Grindelia	5	to	60	minims.
Guarana	15	to	60	"
Hamamelis Leaves	30	to	60	"
Hawthorn Berries	5	to	15	"
Helonias	5	to	60	"
Hemlock Bark	10	to	60	"
Hops	15	to	60	"
Hydrangea	20	to	120	"
Hydrastis	5	to	60	"
Hyoscyamus	1	to	10	"
Indian Cannabis	1	to	10	"
Ipecac	5	to	30	"
Jalap	5	to	30	"
Jamaica Dogwood	5	to	40	"
Juglans	5	to	60	"
Kamala	60	to	180	"
Krameria	10	to	30	"
Lactucarium	10	to	30	"
Lappa	15	to	60	"
Larkspur	1	to	5	"
Leptandra	5	to	60	"
Lobelia	1	to	5	"
Logwood	30	to	60	"
Lupulin	5	to	15	"
Male Fern	1	to	4ß	3.
Matico	30	to	120	minims.
Nux Vomica	1	to	4	"
Pareira	10	to	60	"
Physostigma	1	to	3	"
Phytolacca	1	to	10	"
Pichi	10	to	40	"
Pilocarpus	5	to	40	"
Podophyllum	1	to	20	"
Pomegranate	30	to	60	"
Prickly Ash Berries	5	to	30	"
Quassia	5	to	10	"
Quercus	10	to	60	"
Rhubarb	5	to	30	"
Rubus	10	to	60	"
Rumex	10	to	60	"
Sabal	15	to	60	"
Sarsaparilla	30	to	60	"
Sarsaparilla Compound (used in making Compound Syrup of Sarsaparilla)				
Senega	1	to	30	minims.
Senna	30	to	120	"
Senna, Compound	20	to	60	"
Spigelia	30	to	120	"
Squill	1	to	5	"
Squill, Compound	2	to	3	"
Stillingia	10	to	60	"
Stillingia, Compound	10	to	60	"
Sumbul	5	to	60	"
Taraxacum	60	to	180	"
Trifolium, Compound	30	to	60	"
Triticum	1	to	4ß	3
Viburnum Opulus	20	to	60	minims.
Wafer Ash	10	to	30	"
Wild Cherry	30	to	60	"

TINCTURES.

Acetous Emetic (Comp. Tr. Lobelia)	1/4 to 1		fℨ.
Aconite	1 to	10	minims.
Aloes	2 to	4	fℨ.
Aloes and Myrrh	30 to	60	minims.
Antispasmodic (Comp. Tr. Lobelia and Capsicum)	30 to	60	"
Arnica	5 to	30	"
Asafetida	5 to	60	"
Avena	2 to	4	fℨ.
Belladonna Leaves	1 to	20	minims.
Belladonna Root	1 to	15	"
Benzoin	10 to	60	"
Benzoin, Compound	10 to	60	"
Buchu	1 to	2	fℨ.
Calumba	1 to	2	fℨ.
Cannabis	1 to	30	minims.
Cantharides	**1 to**	**5**	"
Capsicum	1 to	15	"
Capsicum and Myrrh	10 to	60	"
Cardamom	10 to	60	"
Cardamom, Compound	10 to	120	"
Catechu	1 to	3	fℨ.
Catechu, Compound	1 to	3	fℨ.
Cimicifuga	1 to	2	fℨ.
Cinchona	1 to	2	fℨ.
Cinchona, Compound	1 to	2	fℨ.
Cinnamon	20 to	60	minims.
Colchicum Corm	5 to	60	"
Colchicum Seed	5 to	60	"
Cubeb	5 to	120	"
Digitalis	1 to	20	"
Gambir, Compound	30 to	120	"
Gelsemium	1 to	15	"
Gentian	10 to	120	"
Gentian, Compound	10 to	120	"
Ginger	5 to	60	"
Golden Seal	30 to	60	"
Guaiac	30 to	120	"
Guaiac, Ammoniated	5 to	120	"
Hyoscyamus	5 to	60	"
Iodine	Externally.		
Iron Chloride	1 to	30	"
Kino	10 to	120	"
Krameria	20 to	120	"
Lactucarium	10 to	60	"
Larkspur	Externally only.		
Lavender, Compound	15 to	60	minims.
Lemon Peel (for flavoring).			
Lobelia	5 to	30	minims.
Myrrh	10 to	60	"
Nux Vomica	5 to	30	"
Opium, (Laudanum)	1 to	15	"
Opium, Camphorated (Paregoric) (infants 5 to 10 minims)	1 to 4		fℨ.
Opium, Deodorized	1 to	15	minims.
Orange Peel, Sweet (for flavoring).			
Physostigma	1 to	30	"
Quassia	10 to	60	"
Rhubarb	15 to	120	"
Rhubarb, Aromatic	15 to	120	"
Sanguinaria	5 to	30	"
Squill	5 to	30	"
Stramonium	5 to	20	"
Strophanthus	5 to	15	"
Valerian	5 to	120	"
Valerian, Ammoniated	5 to	120	minims.
Vanilla (for flavoring).			
Veratrum Viride	5 to	20	"
Viburnum Opulus	20 to	120	"
Warburg's	1 to	4	fℨ.

SYRUPS.

Asarum Compound	1/2 to	1	fℨ.
Calcium Lactophosphate	1/2 to	4	fℨ.
Ginger	1/2 to	4	fℨ.
Hydriodic Acid	1/2 to	1	fℨ.
Hypophosphites (calcium, sodium, and potassium)	1 to	2	fℨ.
Ipecac	2 to	60	minims.
Iodide of Iron	15 to	30	"
Lactucarium	1/2 to	2	fℨ.
Partridgeberry, Compound (Mother's Cordial)	2 to	4	fℨ.
Phosphates, Compound (Chemical Food—calcium, iron, sodium and potassium)	1/2 to	1	fℨ.
Raspberry	Vehicle.		
Rhubarb	1 to	4	fℨ.
Rhubarb, Aromatic	1 to	4	fℨ.
Rhubarb and Potassa, Compound (Neutralizing Cordial)	1/4 to	2	fℨ.
Sarsaparilla, Compound.	Vehicle.		
Senega	1 to	2	fℨ.
Squill	1/2 to	1	fℨ.
Stillingia, Compound	1/2 to	1	fℨ.
Tar	1 to	4	fℨ.
Tolu	1 to	4	fℨ.
Trifolium Compound	2 to	4	fℨ.
Wild Cherry	1 to	2	fℨ.
Wormseed, Compound	1/2 to	1	fℨ.
Yerba Santa, Aromatic	2 to	4	fℨ.

WINES, MEDICATED.

Colchicum Corm	1 to	15	minims.
Colchicum Seed	1 to	20	"
Ipecac	5 to	60	"
Tar	30 to	60	"

ELIXIRS.

Adjuvant, Glycyrrhiza, Aromatic (simple), Aromatic (red) — All as Vehicles.

OLEORESINS.

Aspidium	15 to	60	minims.
Capsicum	**1/10 to**	**1**	**minim.**
Cubeb	5 to	20	minims.
Ginger	5 to	20	"

POWDERS.

Compound Licorice Powder	30 to 60		grains
Dover's Powder (Ipecac 10% and Opium 10%)	5 to 15		"
Compound Emetic Powder	60 to 120		"
Diaphoretic Powder	5 to 15		"
Jalap, Compound (Antibilious Physic)	15 to 60		"
Tully Powder (Compound Morphine Powder)	5 to 10		"

= (1/12 to 1/6 gr. morphine.)

XVII. THERAPEUTIC CLASSIFICATION OF DRUGS.

CLASSIFICATION OF DRUGS

Owing to the limitations of exact knowledge concerning the action and effects of drugs, and their application in more than one way, it is obvious that it is impossible to arrange a strict classification of drugs. In the following pages the attempt has been made to satisfy those who demand some sort of classification. This is arrived at from several angles, but chiefly from (1) known therapeutic effects, and secondly (2), from pharmacological action, based upon effect upon tissue and function. While some drugs properly come under more than one head (*e. g.;* ipecac, large doses, emetic; small doses, antiemetic), the individual drugs have been placed chiefly under that therapeutic head in which their most prominent action and effects are known, and only in a few instances repeated where a lesser action is credited to them.

This classification is necessary for those whose methods extend beyond those of Specific Medication, the latter not being largely considered in this connection.

Group I—Drugs used for their Local Effects upon the Skin and adjacent Mucous Membranes (Topical Medicines)

1. Irritants:
   - (*a*) Rubefacients.
   - (*b*) Vesicants.
   - (*c*) Suppurants (Pustulants).
   - (*d*) Escharotics (Caustics and Corrosives).
2. Astringents.
3. Styptics.
4. Emollients (and Demulcents).
5. Protectives.
6. Absorbents.

Topical medicines are those which are applied to the skin and such portions of the mucosa as are naturally exposed to view. Some of them dilate the peripheral vessels of the skin, exciting redness (*Rubifacients*) and their prolonged action may cause subsequent desquamation. Those which inflame the skin and cause an exudation of serum between its true structure and the epiderm, are the blistering agents (*Vesicants* or *Epispastics*). Agents which inflame small points which finally end in pustulation are called *Pustulants* (or *Suppurants*); while to those which destroy the life of the tissues, causing a slough or eschar, with a dilatation of the surrounding bloodvessels, the terms *Caustics*, *Cauterants*, or *Escharotics* are applied.

Some drugs cause a constriction of bloodvessels, decrease exudation, contract the muscular fibres when in direct contact (wounds), and precipitate albumen or gelatin, thus causing condensation of tissue. These are called *Astringents*. When the latter control bleeding by acting upon the surrounding tissues and the oozing of blood, and also form clots, they are *Styptics*.

Many agents are employed to alleviate pain by protecting the parts from the air and contact with irritating material, by reducing tension and tumefaction, and relaxing and softening the surface. These are the *Emollients*, and most of them are oily in character. Occasionally colloidal substances are used and called *Demulcents*. The latter agents and the term are more commonly employed in connection with disorders of the mucous surfaces (see also Demulcents under Group IV, I, 7). Other agents are

used solely to protect from outside encroachment (*Protectives*), while still others have the added property of absorbing excessive secretion (*Absorbents*).

The uses of the preceding are obvious, all being now in common use except the vesicants and pustulants, which very largely have been discarded.

1. IRRITANTS.

Rubefacients.

Mustard.
Oil of mustard.
Capsicum.
Turpentine.

Vesicants.

Ammonia water.
Cantharidal collodion.

Suppurants (*Pustulants*).

Croton oil.
Chrysarobin.

Escharotics.

Zinc chloride.
Silver nitrate.
Phenol.
Chromic acid.
Sulphuric acid.
Nitric acid.
Arsenic trioxide.

2. ASTRINGENTS.

Zinc carbonate.
Zinc oxide.
Rose water.
Tannic acid.
Zinc sulphate.

3. STYPTICS.

Turpentine.
Iron chloride.
Iron persulphate.

4. EMOLLIENTS.

Adeps.
Wool-fat (Lanolin).
Yeast.
Ulmus.
Glycerin.
Fig.
Linseed oil.
Cacao-butter.
Petroleum.
Petrolatum.
Soap (detergent).
Libradol.
Poultices.
Impatiens.
Plantago.

5. PROTECTIVES.

Collodion.
Petrolatum.
Spermaceti.
White wax.
Yellow wax.
Bismuth.
Starch.
Talc.
Gelatin.
Wheat flour.
Carron oil (burns).
Paraffin.
Resina.
Plaster of Paris.
The fatty emollients above.

6. ABSORBENTS.

Zinc oxide.
Calcium carbonate.
Starch.
Wheat flour.

Group II.—Drugs used for their Effects upon Pathogenic or other Micro-Organisms and Parasites.

1 and 2 Antiseptics and Disinfectants.
3 Anthelmintics.
4 Parasitics.

Disinfectants (*Germicides*) are agents which kill or destroy micro-organisms or germs and their spores, both pathogenic and non-pathogenic.

Antiseptics are agents which prevent or retard the growth, or arrest the development of organisms, or which render toxins less harmful, or even harmless; or interfere with their absorption, or possibly so strengthen the tissues that they are enabled to resist the toxic influence. Unlike disinfectants they usually do not kill germ-life. A few agents ordinarily used

as antiseptics, if sufficiently concentrated, may prove germicidal. On the other hand disinfectants kill when used of sufficient strength, but when diluted some of them may prove merely antiseptic. Disinfectants may be used locally, where there is no danger of destroying the parts, but are employed chiefly to destroy septic material or germs in the air, or upon clothing, in habitations, in drains and other places harboring infectious and zymotic material. Obviously, disinfectants are not used as such internally, for they would be destructive to the host as well as to the organisms. Some, however, attenuated by dilution, or vaporized with diluting fluids, and the antiseptics proper, are employed for respiratory, intestinal, and urinary antisepsis. Internal antiseptics may inhibit but seldom destroy the organisms. The terms *antiseptic* and *antizymotic* frequently are used interchangeably, but the latter belongs more properly to agents counteracting the putrefactive process known as zymosis. The germs of some diseases are called zymes and the diseases zymotic, though these terms are used less frequently than formerly.

The action of both disinfectants and antiseptics is not well understood, but it is believed to be chiefly chemical, by which they cause coagulation of the albuminous constituents of the micro-organism, or enter into a union with the microprotein. The effects of these bodies vary greatly according to the circumstances and conditions under which they are used. The best disinfectant, where it can be used, is *fire;* the next, *moist heat.* Boiling infected material for ten to fifteen minutes is sufficient to kill all known forms of germ-life.

Some agents, while neither disinfectants nor antiseptics, rob offensive material of its odor. These are the *Deodorants*. They act (1) by oxidation; (2) by dehydration. They need possess neither disinfectant nor antiseptic properties.

Agents which cause the death or facilitate expulsion of worms from the intestinal canal are called *Anthelmintics*. Some drugs (1) kill the parasites (*Vermicides*); (2) others weaken their vitality or possibly paralyze them so that they can no longer retain their station in the intestines, and are then readily removed by catharsis (*Vermifuges*). Worms are the more readily removed when deprived of the sustenance of proteins, and in the presence of irritating foods. As children are those most subject to intestinal worms, it should be remembered that most anthelmintics are poisonous, and if carelessly or wrongly used are capable of doing much harm. Hence they should never be employed without positive evidence of the presence of worms. This is best attested by ocular evidence of the fact that the patient has recently voided some of the parasites; or, if the tapeworm, sections of it.

Parasitics (*Parasiticides* or *Antiparasitics*) destroy both animal or vegetable parasites, whether upon the skin or located in the tubes or tissues of the body. *Antimalarials* (often called *Antiperiodics*) destroy the specific parasite of malaria within the blood. The synonymous term is also used to denote drugs to be used in diseases showing periodicity, in which they tend to mitigate the paroxysms, or to prevent their recurrence. While some are known to be toxic to certain specific germs, not all of them have been so proved; but the probabilities are that they are all destructive in some way to micro-organisms of some types.

1 and 2. ANTISEPTICS AND DISINFECTANTS.

Asepsin.
Iodine.
Iodol.
Iodoform.
Thymol.
Thymol iodide.
Mercuric chloride (corrosive sublimate).
Yellow oxide of mercury.
Salicylic acid.
Bromine.
Lime.
Chlorinated lime.
Labarraque's Solution of chlorinated lime.
Phenol.
Salol.
Creosote.
Lysol.
Cresol (Comp. Sol.).
Creolin.
Trikresol.
Oxalic acid.
Picric acid.
Boric acid.
Sodium biborate.
Sodium sulphite.
Sodium thiosulphate.
Benzoic acid.
Hydrogen dioxide.
Formaldehyde.
Potassium permanganate.
Potassium chlorate.
Resorcin.
Quinine.
Turpentine.
Ichthyol.
Baptisia.
Antiseptic oils.

3. ANTHELMINTICS.

Tænicides:

Granatum.
Pelletierine tannate.
Aspidium.
Pepo.
Kousso.
Kamala.

Round Worms:

Santonin.
Spigelia.
Chenopodium.
Turpentine.

Hook-worms:

Thymol.
Oil of chenopodium.
Monarda.

Ascarides:

Quassia.
Vinegar.
Acetic acid.

4. PARASITICS.

Sulphur.
Resorcin.
Oil of cade.
Copper subacetate.
Betanaphthol.
Quinine.
Potassa sulphurata.
Sulphurous acid.
Balsam of Peru.
Quinine.
Cocculus.
Ammonia water.
Ammoniated mercury.
Chrysarobin.
Staphisagria.

Group III—Drugs used for their Effects upon Nutrition, Metabolism, and Heat-Control.

1. Digestants.
2. Tonics.
3. Reconstructives (Restoratives).
4. Alteratives.
5. Antipyretics.
6. Antiperiodics (see *Parasiticides*, under Group II.)

Agents which favor or assist digestion are important for the upbuilding or nutrition of the body. They—the *Digestants*—include those drugs and products which are the animal and vegetable counterparts of, or the natural peptics and digestive acids, ferments, and enzymes. Thus hydrochloric acid, which is a normal constituent of gastric juice, is not only a direct digestant, but indirectly it prevents fermentative changes in the gastric contents, chemically affects certain ferments, and stimulates peristaltic movements.

These drugs are especially useful in aiding digestion: hydrochloric acid in hypoacidity or achlorhydria; pepsin to digest albumens; pancreatic ferments to convert starches into sugars, proteids into peptones, emulsify fats, etc.

Drugs and other agents and agencies which permanently exalt the energies of the body at large, without vitally affecting any one organ in particular, are known as *Tonics*. While, as a rule, they do not increase the rapidity of the circulation, nor heighten temperature, nor produce marked excitement like stimulants, they do, however, increase muscular tone, sharpen the appetite, improve the processes of digestion and assimilation, strengthen the vascular system, and improve the quality of the blood and the nutrition of the nervous apparatus. Their effect is that of slowly and permanently exalting organic action. While the heart may contract more firmly under their use, its action may not be increased in rapidity though it may gain in power. Tonics change the character of the pulse from flaccidity to firmness and fullness. In short, tonics *tone* the whole system. Without doubt most tonics act primarily upon the nervous system, and while some are of mineral origin the greater number of them is derived from the vegetable kingdom, and most of them are bitter. Formerly there were included among the tonics agents known as antiperiodics. While the result of their use is ultimately tonic they now properly belong with the antiparasitics, as they act upon the protozoa which cause malarial cycles.

Tonics are useful in debilitated conditions of the organs of digestion, and in depressed states of the nervous system. They are especially valuable in convalescence from acute diseases and have long held an enviable reputation in the after-treatment of periodical disorders. When long and excessively employed, tonics may induce febrile reaction and other abnormal effects. They are contraindicated, as a rule, during active fevers and inflammations.

When drugs, such as iron and the mineral acids, act by supplying deficiency in the fluids of the body, or alter their chemical character, they are classed as *Restoratives* or *Reconstructives*. In this group properly belong *Hematinics*, which increase the supply of hæmoglobin in the red discs as well as having a tendency to increase the number of red corpuscles. Plasma-altering drugs (*Alkalizers*) also belong in this group. There are also agents (gelatins and the calcium salts) which favor coagulability of the blood. On the other hand, a few are said to diminish coagulability (certain acids and salts derived from them). Some drugs arrest the migration of white blood corpuscles (quinine and allied alkaloids), and there are those which alter the composition of the hæmoglobin and prevent its union with oxygen (coal-tar group).

The term *Alterative* is an elastic one, used largely as a matter of convenience in considering a group of drugs, the mode of action of which is largely unknown. This much is accepted, however, that all medicines act in such a manner as to alter some function or condition. More strictly, the term alterative is applied to drugs, which by their effects are believed to act in a quiet and unexplainable manner, so as to modify disordered processes of nutrition. Most of them are eliminants of morbific material. How alteratives act is not always known, but their effects are apparent.

Administered in small and continuous doses, alteratives improve the quality of the blood, increase the appetite, promote digestion, and accelerate the processes of elimination. They also improve the condition of the nerve centers, and give an impetus to greater and healthier activity of

the circulatory and breathing organs. The results are those desired in the correction of faulty metabolism, as far as the latter is understood. As normal metabolic processes are still matters of future determination, the effects of alteratives under deviations of metabolic operation cannot now be definitely explained. Almost all of our knowledge concerning alteratives is wholly empiric.

A special action of alteratives is believed to be the breaking down and removal of certain noxious substances in the system; in other words, they have long been thought to act favorably in such constitutional disorders as were formerly included in the misnomer "bad blood," or at present as toxæmia. That they do improve such conditions is evident from their effects in syphilis, scrofula (tuberculosis of the glands), and in tubercular, carcinomatous and malarial manifestations. Though their action cannot be explained, they still constitute a very valuable group of drugs, heterogeneous though they be. The so-called alteratives have been among the most useful of medicines in Eclectic therapy.

Some drugs cause a lowering, some a rise of heat of the body. In health heat is derived from the mechanical movements of the muscles and other parts of the body, and from the oxidation of foods. The temperature in health is maintained in nicely adjusted balance by a heat-regulating function (thermotaxis) believed to reside in a heat-regulating center, or mechanism, presumably located in the basal ganglia of the brain. Such a coördinating center, however, has never been located or proved in any other way; it is merely assumed that it exists. Through this assumption it is conceived that heat-production (thermogenesis) and heat-dissipation (thermolysis) are so nicely adjusted in health that a mean normal temperature of 98.6°F. is maintained regardless of the surrounding variations of heat. Now, when this proportioned balance is disturbed, fever occurs on the one hand, or a subnormal temperature on the other. Whether through the control of the center referred to or not, the body, while gaining heat through muscular movements and food oxidation, also loses heat by radiation and evaporation through the dilatation of the cutaneous capillaries, by the action of external cold (usually compensated for by increased heat-production), by denudation of the epiderm (as in burns), and normally by the output of watery vapor by the lungs and the skin.

Drugs that reduce temperature in fevers are called *Antipyretics* or *Febrifuges*. As a rule they do not affect the temperature in health. Some drugs temporarily depress the heat-center, lowering the increased temperature (coal-tar series); some increase heat-dissipation through the circulation (alcohol, and probably aconite); some lower heat by inducing sweating (diaphoretics); some retard metabolism or lessen oxidation, causing a diminished production of heat (quinine); a few agents cause a great loss of watery vapor by way of the lungs and skin (ether); others produce increased conduction and abstraction of heat (long continued cold bath, ice), and spraying with volatile liquids (ethyl chloride, ether) reduces local temperature by abstracting heat. Refrigerant purgatives (by watery abstraction) and other purgatives, by removing offending or irritating material, cause a subsidence of temperature, when above normal.

The use of antipyretics solely for the forcible depression or reduction of heat is bad medication. The simple means and drugs which approach more nearly the normal bodily functions are always to be selected. All the medical world has come to see the folly of the methods used so freely a few years ago, of depressing temperature by excessive doses of antipyretic drugs, especially those of the coal-tar group.

(A few drugs are known to raise temperature probably by acting upon the heat centers. Among these are belladonna, cocaine, coffee and caffeine, nux vomica and strychnine, and certain of the biologic products.)

1. DIGESTANTS.

Pepsin.
Papain.
Ox-gall.
Diastase.
Hydrochloric acid.
Caroid.

2. TONICS.

Bitter Tonics:

Hydrastis.
Gentian.
Frasera.
Fraxinus.
Cornus.
Coptis.
Nux Vomica.
Colombo.
Chelone.
Berberis.
Berberis aquif.
Aletris.
Quassia.
Ligustrum.

General Tonics:

Nux Vomica.
Berberis.
Fraxinus.
Hydrastis.
Cornus.
Absinthium.
Salicin.
Populus.
Ceanothus.
Prinos.
Euonymus.
Salvia.
Ptelia.
Agrimony.
Aletris.
Cinchona.
Quinine salts.
Coca.
Piper Methysticum.
Myrica.
Iron and strychnine citrate.
Asclepias cornuti.
Ligustrum.

3. RECONSTRUCTIVES (*Restoratives*).

Cod-liver oil.
Phosphorus.
Hydrochloric acid.
Nitro-hydrochloric acid.
Sulphuric acid.
Phosphoric acid.
Nitric acid.
Lactic acid.
Manganese sulphate.
Fowler's solution of arsenic.
Calcium phosphate.
Calcium hypophosphite.
Potassium hypophosphite.
Sodium chloride.
Sodium hypophosphite.
Copper acetate (Tinct.).

Hematinics:

Iron, reduced.
Iron, acid solution.
Iron carbonate.
Iron chloride.
Iron chloride (Tinct.).
Iron acetate (Tinct.).
Iron ferrocyanide.
Iron lactate.
Iron phosphate.
Iron subcarbonate.
Iron sulphate.
Iron hypophosphite.
Iron pyrophosphate.
Iron valerianate.
Iron and ammonium citrate.
Iron and ammonium tartrate.
Iron and quinine citrate.
Iron and potassium tartrate.
Iron and strychnine citrate.

4. ALTERATIVES.

Echinacea.
Phytolacca.
Iris.
Baptisia.
Podophyllum.
Podophyllin.
Stillingia.
Rumex.
Corydalis.
Lappa.
Jeffersonia.
Chionanthus.
Collinsonia
Kalmia.
Condurango.
Colchicum.
Alnus.
Guaiac.

Chaulmoogra.
Trifolium.
Gaultheria.
Sassafras.
Calendula.
Rhamnus californica.
Xanthoxylum.
Sarsaparilla.
Fucus.
Iodine.
Potassium iodide.
Sodium iodide.
Calcium iodide.
Potassium acetate.
Hydriodic acid.
Ammonium iodide.
Sulphur.
Calcium sulphide (crude).
Sodium salicylate.
Mercury.
Mercuric chloride.
Mercuric iodide (red iodide).
Mercurous iodide (yellow iodide).
Arsenic.
Arsphenamine (Salvarsan).
Atoxyl.
Iron arsenate.
Tartaric acid.
Sodium cacodylate.
Chromium sulphate.
Gold and Sodium chloride.
Dulcamara.
Myrica.
Plantago.
Ceanothus.
Lemon juice.
Citric acid.
Chimaphila.
Salicin.
Menispermum.
Manaca.
Liatris.
Polymnia.
Acetic acid.

5. ANTIPYRETICS.

Antipyrine.
Acetanilide.
Phenacetine.
Aconite.
Veratrum.
Gelsemium.
Quinine Salts.
Cinchona and its Alkaloids.
Salicin.

6. ANTIPERIODICS.

Cinchona.
Quinine salts.
Arsenic.
Boletus.
Tela araneæ.
Eupatorium perf.
Agaricus.

Group IV—Drugs used for their Effects upon Secretion and Excretion.

I. On Mucous Membranes and their Glandular Appendages.

A. Alimentary canal:

1. Sialagogues.
2. Stomachics (Peptics).
3. Gastric Sedatives.
4. Carminatives.
5. Emetics.
6. Antiemetics.
7. Demulcents.
8. Absorbents (see also Group I, 6).
9. Antacids.
10. Cathartics:
    - (*a*) Laxatives.
    - (*b*) Simple Purgatives.
    - (*c*) Drastics.
    - (*d*) Hydragogue Cathartics.
    - (*e*) Saline Cathartics.
11. Cholagogues.
12. Astringents:
    - (*a*) Organic (tannin bearing).
    - (*b*) Inorganic (mineral).
13. Pancreatic Stimulants.
14. Gastro-Intestinal Antiseptics.
    - (*a*) Antifermentatives.
    - (*b*) Antiputrefactives.

B. Respiratory Tract:

1. Irritants.
2. Stimulating Expectorants.
3. Sedative Expectorants.

C. Genito-Urinary Tract:

1. Diuretics:
    - (*a*) Hydragogue.
    - (*b*) Renal Depurants.
    - (*c*) Antiseptics.
    - (*d*) Antilithics.
    - (*e*) Lithontriptics.
    - (*f*) Astringents and Repressants
    - (*g*) Genito-Urinary Stimulants.
    - (*h*) Genito-Urinary Sedatives.

II. On Reproductive Organs:

1. Emmenagogues and Uterine Tonics.
2. Galactagogues.
3. Antigalactagogues.

III. On Skin and Appendages:

1. Diaphoretics.
    - (*a*) Sudorifics.
2. Anhydrotics.

A very large number of medicines have an exciting or modifying action upon secretion and excretion, and the parts concerned in these functions.

On the alimentary canal may be noted those which excite the flow of saliva (*Sialagogues*), and those which restrain it (*Antisialagogues* or *Antisialics*). These effects are produced chiefly by the action of drugs upon (1) the nerves entering the salivary glands, notably branches of the chorda tympani and cervical sympathetic trunks; (2) by direct impression of the glandular cells; or (3) reflexly, by stimulation of the terminals of neighboring nerves, as the gustatory and glossopharyngeal. Mental impressions and peptic bitters also reflexly excite the flow of saliva.

Stomachics or *Peptics* sharpen the appetite and increase gastric functional activity. Nearly all of them contain a bitter principle, though alcohol and some of the volatile oils and pungent principles act as gastric excitants. Their action is not well understood, but it is generally conceded that they (1) increase the muscular movements of the stomach, and (2) probably increase secretion by impressing the terminals of the vagi, resulting reflexly in a stimulation of the secretory cells of the glands of the stomach.

Stomachics are used chiefly in atony of the stomach with failing appetite, and in chronic gastric catarrh; and are usually contraindicated when there is marked irritability, inflammation, or hypersecretion (some are valuable in the latter), gastric sedatives being preferred here.

Gastric Sedatives are agents which by their effects upon the peripheral nerves of the stomach, and possibly by inhibition of excessive movements of the organ, produce sedation. The general nervous sedatives used for other purposes often fulfill this office. In Eclectic practice minute doses of gastric excitants (capsicum, ipecac, nux vomica, lobelia) and of the special arterial sedatives (aconite) are often our most effectual gastric sedatives.

Agents which are known to cause or facilitate the expulsion of gas from the stomach and intestines are denominated *Carminatives*. Usually they are aromatic, more or less antiseptic, and by relief of tension physical relievers of pain. They are believed to act by increasing the local circulation of the parts involved, and by provoking increased peristalsis, and relaxation of the gastric orifices.

Vomiting is a reflex act and is produced by many causes, all of which really operate in one way or another upon the vomiting center, a point in close relationship to the respiratory center. Probably this explains why emetics are usually also expectorants. It is the general consensus of opinion that impulses originating in any part of the body may be conveyed to the vomiting center and thus produce emesis. Drugs taken into the stomach, or injected, or absorbed from denuded surfaces, are carried by the blood current, and affect the medullary center. They are then called the *direct*, *specific*, *general* or *centric Emetics*. When by irritation of the nerve-endings of the gastric surfaces they reflexly induce vomiting they are denominated *irritant*, *gastric*, *local*, *mechanical*, or *indirect Emetics*. Some drugs act solely as centric emetics; others as gastric emetics. Some act in both ways. Confusion has arisen from the fact that the terms direct and indirect have been reversed from the positions here given. Unquestionably the best

terms are *centric* and *gastric*. The gastric emetics are less apt to impress the whole system than are the centrics, whose influence often extends to the muscular, nervous, and vascular systems and produces general relaxation, and sometimes sweating.

Emetics are used chiefly (1) to rid the stomach of undigestible or offending material; (2) to evacuate poisons; (3) to dislodge foreign bodies from the stomach or esophagus or adjacent larynx; (4) to aid in the expulsion of false membranes and mucus from the respiratory tract; (5) to compress the abdominal organs and thus aid in expelling mucus, bile, and sometimes concretions from the gall-duct; (6) occasionally to avert spasm by producing relaxation; (7) and rarely for general systemic effect.

Specific Indications for Emetics.—"Emetics are specifically indicated when the tongue is broad, full, dirty, and especially coated at its base. There is sometimes nausea, disgust for food and drink, and everything taken seems to stop at the stomach. The patient complains of sensations of weight and oppression at the epigastrium" (Scudder's *Materia Medica*, p. 112).

Contraindications.—Emetics are contraindicated, as a rule, where there is a marked determination of blood to the brain, as in cerebral congestion, apoplexy, and phrenitis; atheroma, arterio-sclerosis, aneurysmal, and other organic degenerations of the circulatory organs; in pregnancy and herniæ; in marked gastro-intestinal irritation or inflammations; in advanced inflammations and fevers; and in cases of great debility. As a rule, they are not to be used in corrosive poisoning by the tissue-destroying acids or alkalies.

As emesis depends upon a variety of causes, only certain types of vomiting are relieved by the *Antiemetics* proper, agents which probably act (1) directly upon the vomiting center, depressing it, or (2) indirectly upon the gastric sensory nerve terminals. When vomiting is due to kidney disease, to pregnancy, reflexly from pain, or purely nervous or hysterical, it must be specially rectified and cannot, as a rule, be controlled by so-called antiemetics. When due to irritation of the vomiting center or to gastric irritability, cancer or gastric ulcer, the antiemetics may relieve. Agents which are antiemetics are also generally among those named in the group of gastric sedatives.

Agents of a colloidal type designed to soften, relax, relieve tension, diminish pressure, and protect from inflammation and friction are grouped under the name *Demulcents*. They are usually of a mucilaginous or syrupy nature and are used chiefly upon mucous membranes. Rarely, they are applied to the skin. Somewhat similar in action, and nearly always applied to the skin and exposed mucosa, are the emollients, preparations chiefly of an oleaginous character.

Absorbents are physical agents which take up by absorption the excessive fluids or gases in the gastro-intestinal tube.

Antacids act chemically, overcoming excessive acidity. They also serve in many instances as antiseptics, checking or retarding fermentation and putrefaction.

Acids are sometimes required to furnish a deficiency of such agents, and for their general effect upon secretions not only of the intestinal tube but upon the renal and vesical contents.

Gastric Antacids are especially valuable to prevent lactic, butyric and acetic fermentation, and prevent or relieve pyrosis and sour eructations. They often promptly relieve gastralgia due to excessive acidity, and are useful to lessen hyperacidity in hyperchlorhydria. They are required in alkali poisoning; and their influence is sometimes needed in parts remote from the stomach, as in extreme acid conditions of the urine.

Cathartics are agents which cause evacuation of the bowels. They are divided into classes according to their intensity of action and the character of the stools produced. Cathartics are often spoken of in general as purgatives, and purgatives as cathartics. They act (1) by increasing peristalsis, and also (2) it is generally believed, but still a matter of dispute, by exciting an increase of the natural secretion of the glands of the intestinal tract. A few are thought to act by salt action (*Salines*).

Cathartics are divided into *Laxatives* or *Aperients* when mild in action and causing but little evacuation beyond that of normal and with but little or no increase of secretions. A similar action increased in severity and with semiliquid stools is produced by the *Purgatives*. Necessarily a laxative may be a purgative or a purgative a laxative according to dose and conditions under which it is administered. Agents which act harshly or violently, and may, in overdoses, cause enteritis, and often emetocatharsis, are called *Drastics*. When a brisk action, with full evacuations and an augmentation of the intestinal and accessory glandular juices, but not in sufficient force to create enteric inflammation, are caused by drugs, some physicians reserve for such the general name *Cathartics*. Agents which cause copious watery stools are denominated *Hydragogues*, a class which may include the *Vegetable Hydragogues* and the *Saline Purgatives*. The latter, being cooling and capable of reducing the body-heat, are sometimes referred to as the *Refrigerant Cathartics*. A few drugs are believed to stimulate the bile-secreting apparatus to a greater output of bile, and at the same time produce purgation. These are called *Cholagogues*. Small doses of cholagogues may act silently upon the liver and not produce catharsis. These are often more effectual as medicines than doses which also purge. *Emmenagogue Cathartics*, like hellebore and aloes, by acting directly upon the pelvic viscera, assist in the establishment of menstruation.

Laxatives or purgatives are in common use (1) to cleanse the gastrointestinal tube; (2) to promote hepatic activity; (3) to overcome acute and chronic constipation (the latter seldom achieved when cathartic doses are used); (4) to act as derivatives in certain brain disorders; (5) to assist in the removal of dropsical fluid; (6) to rid the body of toxic material giving rise to autointoxication; and (7) to promote a general sense of well-being. If used with judgment, cathartics are valuable medicines; as usually abused they are capable of more harm than good.

Agents, which when brought into contact with the tissues in any part of the body cause a constriction or condensation of the same, are denominated *Astringents*. Their action is undoubtedly chiefly chemical, acting by precipitating albumen, and to some extent by shrinking protoplasm, constricting secreting-cells, or local blood-vessels. The effects are best observed upon the mucosa. Tannin is the astringing principle of the vegetable astringents, while the mineral astringents comprise the metallic

salts. They are used chiefly as protectives, to restrain secretion and to check hemorrhages (styptics). Besides these, they are believed by many to have a remote but undefined action upon the body at large, conserving tone and strength. This old view is shared by only a few at the present day; but is probably not wholly groundless.

Pancreatic Stimulants are agents which increase pancreatic secretion.

Gastro-intestinal Antiseptics are agents which prevent, retard, or overcome gastric fermentation or putrefaction.

The *Respiratory Irritants* are agents which excite local action, such as the *Sternutatories*, which increase nasal secretion and provoke sneezing; and the *Errhines* which properly excite secretion only. Both act upon the vaso-motor control, causing some increase in arterial tension, while the former excites the respiratory center through conduction of the irritating impulse by the nasal branch of the fifth cranial nerve, and sneezing results. Powdered drugs are usually employed, though some pungent gases may have a similar effect.

Agents which modify the quality and quantity of the secretions of the respiratory mucous membrane and facilitate its expulsion are called *Expectorants*. Some drugs impress the respiratory tract by acting directly upon the glands of the mucosa, some act through centric influence, others by local irritant properties (especially vapors), and some by antibacterial and antiseptic powers. Also drugs and measures which modify the action of the circulatory and other organs have an indirect effect upon secretion and excretion of bronchial mucus.

When drugs promote or excite secretion and render the sputum less viscid they are termed *Sedative Expectorants*. The smaller doses of drugs which in full amounts cause emesis usually act in this manner. This class of expectorants often causes increased liquefaction of the secretions, depletes congested surfaces, renders offending material less irritating by attenuation, and occasionally acts through an antibacterial influence. They are indicated by the dry, hard cough, with under-secretion and little or no expectoration.

Drugs which lessen the quantity of secretion, probably by allaying irritation and raising the tone of the mucous membrane and sometimes through antisepsis, are called *Stimulating Expectorants*. These are indicated by over-secretion, loud mucous rales, loose cough, and abundant expectoration. (For action of drugs upon respiration, see also Group V, C.)

Diuretics act upon the kidneys, increasing the secretion of urine. Some agents act directly upon the secreting cells; others through increased blood-pressure and blood supply. Their efficiency depends largely upon the integrity of the renal organs, congestion preventing adequate secretion, and destroyed cells contributing to anuria. Agents which increase the power of the heart and give better tone to the blood vessels, usually, if the kidneys be intact, act as efficient diuretics in disease. Cold, checking the cutaneous function, and the imbibition of water generally increase diuresis, and these are invoked to rid the system of already broken-down material of the body. When drugs do this they are called *Renal Depurants;* agents which increase the fluid output only, *Hydragogue Diuretics*.

Diuretics are useful and indicated to maintain renal activity in deficient urination, particularly in febrile states, when only the non-stimulating

and refrigerant types should be used. The alkaline salts are used in acid conditions, and together with plenty of water when uric acid is abundant. Both water and the latter are especially valuable to soothe and lessen irritation, and to prevent the formation of calculi. Many substances are given to render the urine as antiseptic as possible (*Urinary Antiseptics*), and some drugs diuretic in themselves carry antiseptic principles. Other agents are given to repress the secretion of urine (*Astringents* or *Repressants*), as in polyuria.

There are some drugs which, while increasing the urinary output, have a direct stimulating effect upon the mucous passages as well. These may be called *Genito - Urinary Stimulants*. Many of them owe their virtues not alone to their stimulating qualities, but to antiseptic principles they contain. For this reason they inhibit or retard bacterial growth and subsequent urinal decomposition. In excessive amounts they may cause inflammation of the whole urinary tract, and when the latter is active from other causes they are contraindicated. They are, however, often useful in so-called subacute, acute, and chronic types of cystitis, urethritis, and even when pus is present, as in the same grades of pyelitis. On the other hand there are drugs which, in addition to alkalinizing or acidifying qualities, or to demulcent or antiseptic effect, have a general sedative action upon the genito-urinary mucosa. These are the *Genito - Urinary Sedatives*.

It has also been commonly supposed that certain agents have the power to dissolve concretions. This is doubtful, though some drugs appear to have a disintegrating effect by dissolving the cementing substance binding together particles of gravel. Hence the term *Antilithics*, and *Lithontriptics*, though not strictly apt, are still retained in therapeutic classifications.

A few medicines are believed to act directly upon the uterine mucous membranes, producing or increasing the menstrual flow. These are the direct *Emmenagogues*. As the need for emmenagogues usually depends upon anemia, debility, some constitutional disorder, or a pelvic malady, the correction of these, when practicable, usually is followed by a restoration of the menstrual function. General and uterine tonics and blood restoratives generally act indirectly as emmenagogues.

The secretion of milk is probably a purely local or independent function of glandular action, and its perfection depends largely upon the general state of health. However, some drugs are believed to impress the gland tissues themselves, or to stimulate some nervous mechanism connected therewith, causing an increased production of milk. These are the *Galactagogues*. Agents and conditions acting inversely prove *Antigalactagogue*.

Both cold and warm water, the body being kept warmly covered, and certain drugs increase perspiration. Drugs used for this purpose are *Diaphoretics*. In many instances sweating occurs indirectly through influences producing a sudden dilatation of the peripheral blood vessels, as respiratory depression with dyspnœa, strong emotions, as joy or fright, and nausea. Drugs which increase sweating are those which (1) stimulate the special nerve terminals in the sweat glands, or (2) indirectly the cells of the sweat centers (central nervous system), or (3) reflexly irritate the peripheral sensory terminals, or (4) drugs which increase the peripheral blood supply. When drugs cause profuse sweating they are *Sudorifics*.

Conversely agents that (1) lessen irritability of the sweat centers, or (2) depress the secretory cells of the sudoriferous glands, or (3) their terminal nerves, check excessive sweating, are called *Antihydrotics* or *Anhydrotics*.

Diaphoretics are valuable to prevent or arrest local congestion or inflammation when caused by sudden checking of perspiration by cold or other agencies; to rid the body of poisonous detritus, especially in uræmia; and to promote the elimination of dropsical effusions.

Antihydrotics are useful in colliquative sweating and in local hyperhydrosis and bromidrosis.

A. ALIMENTARY TRACT.

1. Sialagogues.

Pilocarpus.
Sanguinaria.
Piper.
Capsicum.
Cubeba.
Ginger.
Mustard.
Ether.
Chloroform.
Physostigma.
Ipecac.

2. Stomachics (*Peptics*).

Nux vomica (small doses).
Hydrastis.
Hydrochloric acid.
Capsicum.
Gentian.
Piper Methysticum.
Calumba.
Frasera.
Alcohol.
Volatile oils.

3. Gastric Sedatives.

Amygdalus.
Bismuth.
Charcoal.
Morphine (minute doses).
Nux vomica (minute doses).
Aconite (minute doses).
Ipecac (minute doses).
Lobelia (minute doses).

4. Carminatives.

Cinnamon.
Cloves.
Peppermint.
Spearmint.
Coriander.
Calamus.
Piper.
Wintergreen oil.
Anise.
Fennel.
Asepsin.
Nutmeg.
Oil of cajuput.

5. Emetics.

Lobelia.
Ipecac.
Squill.
Zinc sulphate.
Copper sulphate.
Apomorphine hydrochloride.
Mustard.
Sodium chloride.
Sodium bicarbonate (in acid stomach).

6. Antiemetics.

Ipecac (minute dose).
Cocaine.
Aconite.
Nux Vomica.
Cerium oxalate.

7. Demulcents.

Flaxseed.
Egg-albumen.
Ulmus.
Honey.
Barley.
Starch.
Acacia.
Marshmallow.
Sugar.
Glycyrrhiza.

8. Absorbents.

Agar.
Charcoal.
Chalk.
Bismuth.

9. Antacids.

Chalk.
Sodium bicarbonate.
Potassium bicarbonate.
Potassium hydroxide.
Sodium hydroxide.
Potassium carbonate.
Calcium hydroxide.
Sodium carbonate.
Asepsin.
Ammonia.

10. Cathartics.

Laxatives:
- Rhubarb.
- Cascara sagrada.
- Phenolphthalein.
- Liquid petrolatum.
- Juglans.
- Taraxacum.
- Manna.
- Olive oil.
- Magnesium oxide.
- Magnesium carbonate.
- Aloes.
- Sodium phosphate.
- Frangula.
- Rhamnus californica.
- Calomel.
- Agar-agar.

Salines:
- Magnesium sulphate.
- Solution of magnesium citrate.
- Sodium sulphate.
- Sodium phosphate.
- Rochelle salt.

Simple Purgatives or Cathartics:
- Castor oil.
- Jalap.
- Senna.
- Podophyllum.
- Podophyllin.
- Leptandra.
- Cassia marilandica.

Drastics:
- Croton oil.
- Colocynth.

Hydragogue Cathartics:
- Elaterium.
- Hellebore.
- Gamboge.
- Colocynth.
- Veratrum album.

11. Cholagogues.

- Sodium salicylate.
- Podophyllum.
- Podophyllin.
- Chionanthus.
- Chelidonium.
- Ox-gall.
- Sodium phosphate.
- Sanguinaria.
- Iris.
- Grindelia.

12. Astringents.

(*a*) *Organic:*
- Tannic acid.
- Gallic acid.
- Geranium.
- Rhubarb (secondary).
- Mangifera.
- Cinnamon.
- Hemlock.
- Epilobium.
- Erigeron.
- Nutgall.
- Gambir.
- Hæmatoxylon.
- Hamamelis.
- Kino.
- Rhatany.
- Quercus.
- Rubus.
- Rhus glabra.
- Urtica.

(*b*) *Inorganic:*
- Alum.
- Iron and ammonium sulphate.
- Solution of ferric chloride.
- Monsel's solution.
- Zinc sulphate.
- Lead acetate.
- Copper sulphate.
- Chalk.
- Bismuth subnitrate.

13. Pancreatic Stimulants.

- Ether.

14. Gastro-Intestinal Antiseptics.

- Salol.
- Phenol.
- Potassium chlorate.
- Sodium sulphocarbolate.
- Zinc sulphocarbolate.
- Sodium sulphite.
- Echinacea.
- Charcoal.
- Salicylic acid.
- Salicylate of sodium.
- Asepsin.

B. RESPIRATORY TRACT.

1. Irritants.

- Sanguinaria.
- Ammonia.
- Ipecac.
- Veratrum.
- Veratrum album.
- Ginger.
- Tobacco (snuff).
- Capsicum.
- Cubeba.

2. Stimulating Expectorants.

- Asarum.
- Serpentaria.
- Balsam of Tolu.
- Balsam of Peru.
- Tar.
- Inula.
- Guaiacol.
- Pichi.
- Yerba reuma.
- Eucalyptol.
- Eucalyptus.
- Yerba santa.
- Dracontium.
- Spikenard.
- Ammonium chloride.
- Potassium iodide.
- Onion.
- Garlic.
- Potassium bichromate.

Terpin hydrate.
Terebene.
Stillingia liniment (full dose).
Senega.
Sanguinaria.
Copaiba.
Cubeba.
Squill.
Liquidambar.
Myrrh.
Grindelia.
Arisæma.

3. Sedative Expectorants.

Ipecac.
Lobelia.
Citrate of potassium.
Citrate of sodium.
Acetate of potassium.
Solution of ammonium acetate.
Euphrasia.
Stramonium.
Euphorbia Ipecacuanhæ.
Euphorbia pilulifera.
Euphorbia corollata.
Euphorbia hypericifolia.
Eupatorium perfoliatum.
Drosera.
Quebracho.
Apomorphine.
Anemopsis.
Hydrocyanic acid.
Symphytum.
Stillingia liniment (small dose).
Spongia
Prunus virginiana.
Catalpa.
Hepatica.
Impatiens.

C. GENITO-URINARY TRACT.

1. Diuretics.

(*a*) *Hydragogues:*
Diuretin (Theobromine sodium salicylate).
Mentha viridis.
Petroselinum.
Oxydendron.
Œnothera.
Galium.
Apis.
Eryngium.
Equisetum.
Verbascum.
Capsella.
Triticum.
Spirit of nitrous ether.
Aralia hispida.
Cantharides.
Sparteine sulphate.
Scoparius.
Squill.
Sambucus.
Sugar of milk.
Potassium nitrate.
Digitalis.
Caffeine.
Convallaria.
Cucurbita.
Pepo.
Asclepias incarnata.

(*b*) *Renal Depurants:*
Potassium acetate.
Potassium citrate.
Potassium nitrate.
Potassium bitartrate.
Sodium acetate.
Sodium nitrate.
Basham's mixture.
Eupatorium purpureum.

(*c*) *Antiseptics:*
Diuretin.
Uva ursi.
Hexamethylenamine (Urotropin).
Buchu.
Chimaphila.
Epigeæ.
Copaiba.
Cubeba.
Thuja.
Turpentine.
Pyrola.
Methylene blue.
Sodium benzoate.
Oil of sandal wood.
Juniper.
Matico.
Eryngium.
Eupatorium purpureum.
Lithium benzoate.
Lithium salicylate.
Pichi.
Piper Methysticum.
Ammonium benzoate.

(*d and e*) *Antilithics and Lithontriptics:*
Lithium carbonate.
Lithium citrate.
Lithium benzoate.
Lithium salicylate.
Hydrangea.
Piperazine.
Lycopodium.
Sodium acid phosphate.
Diuretin.
Potassium acetate.
Potassium citrate.
Sodium benzoate.
Dilute nitric acid.
Dilute nitro-hydrochloric acid.
Ammonium benzoate.

(*f*) *Astringents and Repressants:*
Rhus aromatica.
Belladonna.
Uva ursi.
Chimaphila.
Eupatorium purpureum.
Pareira.
Agrimony.

(*g*) *Genito-Urinary Stimulants:*
Apis.
Spirit of nitrous ether.
Cantharides.
Diuretin.

(*h*) *Genito-Urinary Sedatives:*
Staphisagria.
Rhus aromatica.
Sambucus.
Althæa.
Hypericum.
Verbascum.
Zea.
Triticum.
Equisetum.
Eryngium.
Xanthium spinosum.
Xanthium Strumarium.
Serenoa.
Lycopodium.

II. REPRODUCTIVE ORGANS.

1. **Emmenagogues and Uterine Tonics.**
Macrotys.
Senecio.
Gossypium.
Manganese dioxide.
Potassium permanganate.
Tansy.
Actæa.
Caulophyllum.
Leontin.
Ruta.
Hedeoma.
Apiol.
Mitchella.
Pulsatilla.
Helonias.
Liatris.
Viburnum prunifolium.
Viburnum Opulus.
Salix nigra.
Ustilago.
Ergot.
Viscum.
Leonurus.
Lilium tigrinum.
Iron salts.
Myrrh.
Borax.
Alcohol.
Fraxinus.

2. **Galactagogues.**
Pilocarpus.
Castor oil leaves (locally).
Anise.
Vanilla.
Physostigma.
Potassium chlorate.
Alcohol.

3. **Antigalactagogues.**
Belladonna.
Camphor.
Antipyrine.
Sage.

III. SKIN AND APPENDAGES.

1. **Diaphoretics.**
Asclepias.
Corallorhiza.
Jaborandi (Pilocarpus).
Pilocarpine.
Anthemis.
Serpentaria.
Crocus.
Carthamus.
Matricaria.
Opium.
Dover Powder.
Diaphoretic Powder.
Monarda.

2. **Anhydrotics.**
Agaricus.
Agaricine.
Salvia.
Aromatic sulphuric acid.
Leucanthemum.
Camphoric acid.

Group V. Drugs used for their Effects upon the Circulation and Respiration.

A. Cardiants:
1. Heart Stimulants.
2. Heart Sedatives.
3. Heart Tonics.
4. Special Sedatives.

B. Vaso-Cardiants:
1. Vasomotor Stimulants.
2. Vasomotor Sedatives.

C. Respirants:
1. Respiratory Stimulants.
2. Respiratory Depressants (Sedatives).
3. Antispasmodics (see also Group VI, 3).

The parts and functions of the various parts of the circulatory, and to some extent those of the respiratory, systems are so interwoven and inter-related that the effects of drugs impressing one part or function are apt to be reflected in the others. The control over the circulation by drugs is by (1) direct action upon the heart-muscle, (2) by direct impression upon the cardiac centers and ganglia, (3) by those regulating the tonus and lumen of the blood vessels, and (4) by agents which produce changes in the composition of the blood.

Heart Stimulants increase the rate of the heart-beat but do not necessarily augment its power or force. They are used chiefly in shock, syncope,

and in circulatory depression in emergencies and in acute inflammatory or febrile diseases.

Heart Sedatives (*Heart-Depressants*) decrease both the rate and the force of the heart-beat. They are used in nervous over-action of the heart associated with general nervous irritability of a sthenic character, and to lower blood pressure in aneurysmal and arterio-sclerotic conditions and in hypertrophy of the heart. Their need is generally shown by an overly vigorous circulation, with full, straining pulse.

Heart Tonics slow the heart, increase its tone, and improve its nutrition. They are of value in faulty nutrition and debilitated states of the heart due to anatomic or constitutional causes; or to mechanical non-adaptability of the heart to the work imposed upon it, or to over-strain of that organ from any cause, even when the result of functional autotoxæmias is due to the toxins of general infectious diseases.

The term *Special Sedatives* (*Arterial Sedatives*) has been applied in Eclectic therapy to small doses of agents which in large doses are strongly depressant upon the circulation. These are used in minute doses (usually), which then really act as stimulants, for their effect in reducing rapid action of the heart and gradual lowering of temperature. When so employed they are never depressing, and have been among the most valued of therapeutic means used by the specific medicationist. The chief of these drugs are Aconite, Veratrum, and Gelsemium.

Vaso-Stimulants (*Vaso-Constrictors*) constrict the blood vessels, lessening their calibre. They are governed chiefly from the vaso-motor center in the medulla. Their important offices are to assist in raising blood pressure in states of collapse, or of shock, and indirectly to increase cardiac force. Locally they act as hemostatics.

Vaso-Sedatives (*Vaso-Dilators*) relax arterial walls, and like the constrictors are governed by the centric center. By lowering blood pressure they are of special service in arteriosclerosis, angina pectoris, eclampsias, chronic nephritis, convulsions (with high blood pressure), and indirectly to decrease force and increase the rate of heart action, relieving the organ from overwork.

The respiratory tract is acted upon by drugs which directly stimulate the respiratory center in the medulla—*True Respiratory Stimulants;* or indirectly by stimulation produced reflexly by artificial methods of inducing respiration (Sylvester's method, Laborde's rhythmic traction on the tongue), by the sudden application of cold, electricity, or by irritating the nasal branches of the fifth cranial nerves by means of pungent gases. These are called *Respiratory Stimulants.*

Conversely depression of the respiration may be caused by drugs which directly depress the medullary center (*True Respiratory Depressants*), by excessive doses of those which depress the spinal cord (spinal cord depressants), and by drugs which cause poisoning by asphyxiation (the latter being caused in several ways). To all these where respiration is depressed is applied the term *Respiratory Depressants.* (See also Group IV, B-3, for *Sedative Expectorants.*)

Respiratory Stimulants are employed in dyspnœa, in certain stages of inflammation of the lungs, emphysema, and threatened asphyxiation, especially from poisons.

Respiratory Depressants (*Sedatives*) are used to relieve respiratory pain and cough, often being unwisely pushed to the detriment of the patient.

Drugs which relieve asthmatic breathing have been called *Respiratory Antispasmodics* or *Antiasthmatics*. Evidently they act by relaxing local muscular spasms, the assumed action which takes place during an asthmatic seizure. Probably they exert their effects through motor and nerve depression. (See also Group VI, 3 and 6.)

A. CARDIANTS.

1. Heart Stimulants.

Digitalis.
Strophanthus.
Ammonia (inhalation).
Ether.
Ammonium carbonate.
Adonis.
Cratægus.
Alcohol.
Convallaria.
Cactus.
Apocynum.
Epinephrine (Adrenalin).
Amyl nitrite (brief).
Sodium nitrite.
Opium.
Morphine.
Sparteine sulphate.
Coffee.
Caffeine.
Nux vomica.
Strychnine.
Atropine.

2. Heart Sedatives.

Aconite.
Veratrum.
Gelsemium.
(In minute doses these are heart stimulants.)

3. Heart Tonics.

Digitalis.
Cactus.
Cratægus.
Adonis.
Convallaria.
Apocynum.

4. Special Sedatives.
(*Arterial-Sedatives*).

Aconite.
Veratrum.
Gelsemium.
Rhus.
Bryonia.
Lycopus.

B. VASO-CARDIANTS.

1. Vasomotor Stimulants.
(*Vaso-Contractors*).

Adrenalin (Epinephrine.)
Digitalis.
Caffeine.
Coffee.
Ergot.
Pituitrin.
Hydrastinine.
Hamamelis.
Camphor.
Strychnine.
Opium (small dose).
Atropine (small dose).

2. Vasomotor Sedatives.
(*Vaso-Dilators*).

Nitrite of sodium.
Potassium nitrite.
Amyl nitrite.
Nitroglycerin.
Cathartics.
Alcohol.
Ether.
Chloroform.
Ipecac (full doses).
Opium (full doses).

C. RESPIRANTS.

1. Respiratory Stimulants.

Strychnine.
Nux vomica.
Atropine.
Belladonna.
Ammonia (inhalation).
Ammonium chloride.
Camphor.
Eucalyptus.
Lobelia (small dose).
Grindelia.
Spirit of Mindererus.
Aromatic spirit of ammonia.
Alcohol (transient).
Ether (transient).
Opium (minute dose).
Caffeine.
Ipecac (minute dose).
Monarda.
Myrrh.

2. **Respiratory Sedatives.**

Lobelia.
Ipecac.
Potassium citrate.
Potassium acetate.
Sodium bromide.
Potassium bromide.
Amyl nitrite.
Hydrocyanic acid.
Amygdalus Persica.
Prunus virginiana.
Alcohol.
Ether.
Chloroform.
Chloral.
Gelsemium.
Aconite.
Bromoform.
Quebracho.
Squill.
Yerba santa.
Tolu.
Penthorum.

3. **Respiratory Antispasmodics (Anti-asthmatics).**

Stramonium.
Lobelia.
Potassium nitrate.
Potassium iodide.
Morphine.
Castanea.

Group VI. Drugs used for their Effects upon the Nervous and Muscular Systems.

NERVINES.

1. Nerve Stimulants (Cerebral Stimulants).
2. Nerve Sedatives (Cerebral Sedatives).
   (*a*) Somnifacients (Hypnotics).
   (*b*) Anodynes (Analgesics).
   (*c*) Anæsthetics:
      x General.
      y Local.
      z Antipruritic.
3. Antispasmodics.
4. Anticonvulsants.
5. Motor Excitants.
6. Motor Depressants.
7. Mydriatics.
8. Myotics.
9. Antihemorrhagics.

Owing to selective affinity certain drugs expend their whole force upon the nervous system, not all parts of which, however, are acted upon alike. Some impress that portion of the central nervous system involved in the so-called higher development; some the spinal portion. Some act upon the brain cells at the origin of the nerves; some upon the peripheral nerve endings, while still others impress both. Located in different areas of the central nervous system are collections or limited aggregations of specialized areas composed of peculiar nerve cells whose office is the control over particular functions. These are known as "nerve centers". Thus, in the cerebrum are the so-called higher centers, whose positions are not all so definitely known as some others—governing the emotional, psychic, and intellectual acts—perception, the will, thought, consciousness, and indirectly the whole living body. In the cortex are the more definitely defined centers of speech, of the muscular movements, and of sight. It is in the medulla, however, that the so-called *vital centers* are found—those governing the very control of life and whose integrity should be especially regarded in the administration of drugs. There is a respiratory center controlling the function of breathing, an accelerator center for the quickening of the heart's action, a vagus or inhibiting center for slowing the heart-beat, a vaso-motor center which causes the arteries to contract or to dilate accordingly as they are stimulated or depressed, and a vomiting center which controls the act of emesis. Besides these there is believed to be a thermic center, whose business is the regulation of the heat-balance of the body. These centers are closely aggregated and in close proximity to each other. A knowledge of them and of the effects of drugs thereon is of the greatest importance, and no large survey of drug action can be comprehended without taking them into consideration.

Further down the nervous tract, in the cord, are the reflex centers—those which have control over reflex activity, and the motor centers having the regulating power over muscular movements. Some of the nerve trunks are connected directly with the sympathetic nervous system by the nervi communicantes, or communicating branches; others are independent of such a union.

The effect of drugs, by selective action, whether it be upon the nerve cells, the centers, or the terminals, is either to *stimulate* or to *depress* them. Stimulation usually increases functional power, as when the vagus is stimulated, though it may inhibit rapidity of action; depression lowers function. Overstimulation may precipitate convulsions. Overdepression means progressively paralysis, stupor, coma, or death, all being brought about by the depression of the vital centers in the medulla—a series of phenomena best exhibited in the action of so-called physiologic poisons.

Only the specialized types of muscles and of the involuntary type (non-striated) seem to be directly acted upon by drugs. The voluntary (striated) muscular movements are governed by the effects of drugs upon the nerves supplied to them. Indirectly the latter are impressed by drugs and measures affecting the general system, as tonics, exercise, massage, electricity, etc. The involuntary types of musculature, however, are directly governed by a few drugs, such as those which act upon the heart muscle itself, the intestines, and the uterus. Furthermore, this variety of muscle is indirectly affected by drugs which alter the general state of the system through circulatory control.

Drugs which temporarily increase the functions of one or several organs are denominated *Stimulants*. While, with a few supposed exceptions, nearly all medicines first stimulate, all do not come under the head of stimulants. The latter may equally well be called *Excitants*. Stimulants are, primarily, neurotic agents, for they first impress the nervous system. Some, through nervous influence, govern the circulation and breathing power, temporarily increasing respiratory and arterial activity. The secretions at large are not sensibly augmented, nor are the excretions greatly increased. When, however, drugs act topically, as upon the mucosa of the stomach (*Stomachics* or *Gastric Stimulants*), by their excitant action they increase locally the circulation, the secretions, and the muscular movements. Digestion is quickened by some of them, and the processes of chymification and chylification are facilitated. The whole system consequently partakes, by sympathy, of this local effect.

Of the manner in which stimulants act upon the nervous system (*Nerve Stimulants*) our knowledge is very imperfect. Their effects are better known. Many impress the motor centers of both the brain and the cord. Some are believed to stimulate the brain-cells concerned in psychic processes; some presumably increase reasoning power (coffee and caffeine); some the imagination (opium, alcohol, cannabis, etc.); some produce mental confusion and act as delirifacients (belladonna group, alcohol, etc.); and many of them, which in small doses merely stimulate, in large doses cause convulsions (strychnine). The size of the dose often determines the action, placing the same drug in one or another category. Most stimulants increase the activity of the mental function, even producing a degree of

exhilaration; their overaction, as when taken in too large doses or for a continued length of time, tend to impair the mentality, prostration resulting. Stimulants are often named from the parts or functions which they ultimately affect, as the skin (ammonium carbonate), the mucous surfaces (turpentine), the muscular system (nux vomica), which, of course, primarily stimulates the spinal centers. We also have *Respiratory Stimulants*, *Circulatory Stimulants*, and *Nervous Stimulants*, etc. Primarily they are almost all stimulants of nerve tissue. Some *Cerebral Excitants*, given in excessive dose, induce epileptiform convulsions. The use of cerebral excitants may be sufficiently inferred from the preceding considerations. Some of them also are valuable in states of profound depression, such as occur in narcotic poisoning. Thus coffee and caffeine, or belladonna and atropine, may be useful in opium poisoning.

Depressants are agents which act oppositely in most respects to stimulants. The primary action of depressants is probably upon the same anatomic structures and physiologic functions as those for stimulation. Thus we have *Circulatory Depressants*, *Respiratory Depressants*, *Nervous Depressants*, etc. Primarily the depressant action is upon the nervous system. The excessive use of stimulants may result in depression.

Agents which lessen functional activity of the spinal cord are called *Spinal Cord Depressants* or *Motor Depressants* (*Depresso-Motors*). They act by depressing (1) the cells of the lower motor or sensory neurons of the cord; or (2) indirectly by stimulating the inhibitory centers of Setschenow in the medulla oblongata. In very large doses they may also cause a more or less abolishment of power. Some drugs in physiologic doses prove motor depressant (bromides, gelsemium, potash salts, anæsthetics); others so only when given in poisonous doses (quinine, macrotys, opium, cocaine, etc.). A few act more strongly on the sensory than the motor neurons (ether, bromides, chloroform, cocaine); others with a selective force upon the latter (gelsemium, veratrum, chloral, etc.).

These drugs are of value in reducing excessive action or pain from irritation or hyperexcitability; muscular overaction in laryngismus stridulus, tetany, and paralysis agitans; tetanus and tetanic convulsions from poisons; or even in cerebral convulsions by preventing the transmission of nervous explosions from the brain to the muscles, or conduction of external irritation to the brain by way of the spinal pathways.

Some drugs act upon the periphery of the motor nerve. These are the *Motor Nerve Depressants*, notable among which are conium, belladonna, and lobelia. The bromides do the same to a lesser degree, but are active chiefly through cerebral, spinal, and sensory nerve impressions.

Motor nerve depressants are of service in such local disorders of an incoördinate type, as spasmodic asthma, chorea (sometimes), spasmodic torticollis, whooping cough, etc.

The *Sensory Nerve Depressants* (*Nerve Sedatives*) are those which, when given internally, diminish sensibility to pain or discomfort by directly depressing the sensory nerves or their terminals, and more readily in lesser amounts when applied locally. They act both directly and indirectly to relieve pain and itching. Many of them are local anæsthetics and local anodynes.

Drugs which increase the functional activity of the spinal cord are termed *Spinal Cord Excitants* or *Motor Excitants* (*Excito-Motors*). Their effect is the exaggeration of normal reflex action by stimulation of the cells of certain of the lower motor-neurons of the cord. If administered in poisonous doses they cause tetanic convulsions. Even less than poisonous doses of the nux vomica alkaloids sensibly heighten the spinal reflexes; and in toxic doses they are among the most violent of tetanizers.

The motor excitants are used when depression but not destruction of the motor cells of the cord gives rise to loss of power. Under no circumstances should any appreciable amounts of them be given when active inflammation is present, nor should they be given in inflammation of the nervous tract, or for some weeks after the subsidence of the latter (as in the loss of nervous and muscular power after poliomyelitis).

Hypnotics or *Somnifacients* induce sleep. When mild in action they are often called *Soporifics*. Pure hypnotics directly depress the brain cells, inhibiting their functional activity. This inhibitory action is not so complete, however, as to interfere with the recuperative power of the cells, and thus the object of normal sleep is partially obtained at least. Neither is the depression so great as to prevent the recognition of outside stimuli, for one may easily be aroused from the slumber induced. The action of other hypnotics has been explained as due to the withdrawal of, or interference with, afferent stimuli, to the lessening of the blood supply to the brain (temporary anemia), to brain-cell fatigue decreasing their responsiveness to ordinary stimuli, and to nerve-cell waste circulating in the blood current. Wilcox assumes "that it is probable that the anemia is the result of depression of the neurone from retraction of the terminal filaments of the dendrons." When given in ordinary amounts hypnotics merely induce sleep, but when administered in overdoses they produce *narcosis*—a state in which stupor replaces sleep, the cells are depressed until their recuperative (rest) powers are more or less completely suspended and, as has been well expressed, the individual's relationship with external nature has been cut off. Most hypnotics may, therefore, be *Narcotics*. They are also depressants of respiration and the circulation. Some of the narcotics are general anæsthetics also (see page 101).

Hypnotics may be very beneficent agents if properly employed, but medical history bears no greater stain than the record of wrecked lives from their abuse. To scores they have proved a blessing. To thousands they have proved a curse. None of the hypnotics are free from danger; none from the possibility of inducing drug addiction. No hypnotic should ever be used until other means to produce sleep have been exhausted, and the fullest consideration and best judgment of the prescriber invoked. Not only have certain of the narcotics played havoc with the individual, but their reckless and unwise use by the physician has militated to curtail his liberty in the use of medicines and necessitated drastic control on part of the Federal Government. This has added clerical burdens to the prescriber and resulted in a limitation of his once-enjoyed prerogatives in the legitimate use of not only the narcotics, but other powerful agents, such as the alcoholics.

Anodynes relieve pain. They are general when given internally; local when applied topically. *General Anodynes* are more generally called *Analgesics*. They act (1) by depressing the pain-receptive centers of the brain or by lessening the excitability of the centers; (2) by lowering the excitability of the nerves; or (3) by preventing conduction of painful impressions going to the brain by way of the sensory nerves and spinal cord pathways. They do not necessarily abolish consciousness nor induce general insensibility. As general anodynes act systemically, so *Local Anodynes* act locally. They depress or paralyze the sensory nerve terminal at the surface of application. Counterirritants sometimes relieve local pain.

General Anæsthetics are agents which produce total loss of consciousness with abolishment of sensibility to pain and of the reflexes. Their depressing action upon the brain cells is more profound than that of other drugs and the response to external stimuli completely abolished.

Local Anæsthetics produce insensibility at and around the point of application. They do not suspend consciousness. They abolish not only sensibility to pain but in many instances to contact. (Compare Anodynes.)

Agents which act upon the terminals of the sensory nerves, or in any other manner, and thereby relieve itching, are called *Antipruritics*.

Antispasmodics are drugs which lessen nervous irritability and the lesser grades of motor excitation (compare Anticonvulsants). They probably produce sedation through stimulation (not by depression) of the higher brain centers, thus inhibiting inordinate movements by more completely controlling excessive action in the lower motor centers in the cord. Some of them in excessive doses cause depression. They are sometimes called *Antihysterics*.

Antispasmodics are especially valuable in hysteria in its varying forms, to avert local spasmodic action, and to control general nervous excitability.

Anticonvulsives are drugs which depress the motor cells of the cerebral cortex, lessening motor excitability. Some, more than others, in addition to this depression, interrupt or diminish conduction of impulses to and from the brain by way of the spinal pathways—*i. e.*, external stimuli coming to the cerebrum through the sensory tract of the cord, or the transmission of excessive motor discharges from the cortex to the muscles. They thus prevent or control convulsions (compare Antispasmodics). Among the most powerful of the anticonvulsives are the general anæsthetics, which, when inhaled, depress the cerebral motor centers, and less powerfully those of the cord.

The iris has two sets of muscular fibres, both of unstriated variety—the circular and the radiating (presumptive). The former, a constrictor, is governed by the third or motor oculi nerve; the second (if it exists) is probably a dilator, and is under the control of the sympathetic. Depending upon conditions, and to a considerable extent upon the concurrent use of antagonistic drugs, dilatation or constriction of the iris can be made to take place by means of certain drugs (1) applied locally or (2) less rapidly when administered internally. When the motor oculi is stimulated, contraction of the pupil is observed; when the sympathetic is stimulated, dilatation takes place probably through the action of the dilator muscle (if present).

Drugs which cause a dilatation of the pupils are *Mydriatics*. They act (1) by centrally paralyzing the motor oculi center (said to be located in the corpora quadrigemina), or (2) by paralyzing the motor oculi peripheral endings in the iris; or (3) by paralyzing the constrictor muscle itself. Or (1) by stimulating the centric or medullary center of the sympathetic; or (2) by stimulating the peripheral terminals of the latter; or (3) presumably by stimulation of the musculature of the dilator radiating muscles. As the actual presence or status of the last named and their control is problematical, the action of drugs in reference to them is not well established. Drugs act selectively and in differing degrees of power upon one or more of the mechanisms named.

Mydriatics are employed to facilitate the examination of the fundus of the eye by means of the opththalmoscope; to paralyze accommodation in refractive work; in iritis to prevent or break up adhesions and to give the iris rest; to allay irritation of the inflamed cornea; and, alternately with miotics, in ulcers of the margin of the cornea. ' Occasionally, when the marginal area of the lens is clear, they may be employed to widen the field of vision in nuclear cataracts.

All mydriatics are *Cycloplegics*, paralyzing the accommodating or adjusting power of the eye to see objects at near or greater distances. This effect is produced by the drug paralyzing the ciliary muscle.

Miotics (*Myotics*) contract the pupil of the eye, acting exactly in reverse order to the mydriatics. They also lessen the tension of the eye ball and thereby facilitate the escape of the ocular humor.

Miotics are used to counteract mydriasis; to reduce intraocular tension (as in incipient glaucoma; staphyloma); and (alternately with mydriatics) in such disorders as sclero-corneal or marginal ulcers.

Hæmostatics are drugs which, when given internally, arrest hemorrhage. They are thought to act in one or more of the following ways: (1) by vaso-constriction through the vaso-motor nerves; or (2) by direct effect upon the musculature of the blood vessels; or (3) probably by increasing the coagulability of the blood. Those which check bleeding when locally applied are called *Styptics* (sometimes *Local Hæmostatics*). The modus operandi of hæmostatics is still a question of dispute, many contending that astringents, such as tannin and certain mineral agents, are absorbed in a changed condition, or in inadequate amount to check hemorrhage, and that they only act when given by mouth upon hemorrhages into the gastro-intestinal canal; that ergot, so much relied upon in the past, can only act where non-striated muscle is maintained to the ends or periphery of the vessels, or where it is present in the tissues in which the latter terminate, hence its value in uterine hemorrhage, and its probable worthlessness in hemoptysis and renal hemorrhage. It is also assumed that if vaso-constriction is sought for as the cause of arrest of bleeding, such a view is contradictory, for in all probability the bleeding vessel alone is not constricted, but the whole system of vessels, through vaso-motor control. This would raise tension in the vessels and thus increase the probability of hemorrhage and the preventing of clotting. When bleeding vessels can be reached surgically, ligation is the surest and safest procedure. Shock by means of cold, suddenly applied, and rest favor the arrest of bleeding.

NERVINES.

1. Nerve Stimulants.

Cerebral Stimulants:

Strychnine.
Nux vomica.
Ignatia.
Arnica.
Rhus.
Sumbul.
Avena.
Coffee.
Caffeine.
Kola.
Panax.

2. Nerve Sedatives.

Cerebral Sedatives:

Gelsemium.
Belladonna.
Stramonium.
Pulsatilla.
Valerian.
Macrotys.
Matricaria.
Cypripedium.
Scutellaria.
Solanum.
Tobacco.
Bryonia.
Nepeta.
Guarana.
Melilotus.
Sticta.
Æsculus glabra.
Hippocastanum.
Humulus.
Lupulin.
Lactucarium.
Black haw.
Viburnum Opulus.
Dulcamara.
Aspirin.
Dioscorea.
Duboisine.
Conium.
Cannabis.
Physostigma.
Asafœtida.
Camphor, monobromated.
Acetanilid.
Sodium bromide.
Potassium bromide.
Ammonium bromide.
Strontium bromide.
Lithium bromide.
Iron bromide.
Calcium bromide.
Zinc phosphide.
Zinc valerate.
Chloral.

(*a*) *Somnifacients* or *Hypnotics:*

Opium.
Morphine.
Hyoscyamus.
Hyoscine (Scopolamine).
Scopolamine hydrobromide.
Paraldehyde.
Barbital (Veronal).
Trional.
Sulphonal.
Passiflora.

(*b*) *Anodynes:*

Opium.
Morphine.
Codeine.
Aspirin.
Acetanilid.
Phenacetine.
Antipyrine.
Piscidia.
Dioscorea.

(*c*) *Anæsthetics.*

(*x*) *General Anæsthetics:*

Chloroform.
Ether.
Nitrous oxide.
Ethyl bromide.
Ethyl chloride.
Butyl-chloral.

(*y*) *Local Anæsthetics:*

Cocaine.
Procaine (Novocaine).
Ethyl chloride.
Eucaine.
Stovaine.
Holocaine.
Alypin.
Tropacocaine.
Apothesine.
Urea and quinine hydrochloride.
Veratrine.

(*z*) *Antipruritics:*

Menthol.
Phenol.
Camphor.
Chloral.
Aconite.
Antipyrine.
Veratrine.

3. Antispasmodics.

Asafœtida.
Lobelia.
Œnanthe.
Lavandula.
Camphor.
Stramonium.
Solanum.
Belladonna.
Hyoscyamus.
Lupulin.
Hops.
Amyl nitrite.
Opium.
Valerian.
Monobromated camphor.
Macrotys.
Black haw.
Cannabis.
Scutellaria.

4. Anticonvulsants.

Chloroform.
Ether.
Gelsemium.
Lobelia.
Chloral hydrate.
Morphine.
Jacaranda.

5. Motor Excitants.

Strychnine.
Nux vomica.
Ignatia.
Cocaine.
Ergot.
Ustilago.
Gossypium.
Picrotoxin.
Camphor.
Cimicifuga (Macrotys).
Rhus Toxicodendron.
Pilocarpus.
Digitalis.
Convallaria.
Small doses of alcohol, ether, or chloroform. Large doses of morphine or atropine.

6. Motor Depressants.

Gelsemium.
Lobelia.
Bromide of sodium.
Bromide of potassium.
Bromide of lithium.
Bromide of calcium.
Opium.
Morphine.
Belladonna.
Atropine.
Stramonium.
Hyoscyamus.
Digitalis.
Pilocarpus (Jaborandi).
Pilocarpine.
Chloral.
Aconite.
Veratrum.
Arnica.
Camphor.
Pulsatilla.
Black haw.
Piscidia.
Æsculus.
Physostigma.
Physostigmine.
Large doses of alcohol, ether, chloroform, or quinine.

7. Mydriatics.

Atropine.
Homatropine hydrochloride.
Cocaine.
Gelseminine.

8. Myotics.

Eserine (Physostigmine).
Pilocarpine.

9. Antihemorrhagics.

Ergot.
Calcium.
Cinnamon.
Adrenalin.
Pituitrin.
Calcium chloride.
Oil of erigeron.
Oil of erechtites.
Mangifera.
Yarrow.

Group VII. Drugs used for their Effects upon the Reproductive Organs.

1. Emmenagogues (see Group IV. Reproductive Tract, 1).
2. Aphrodisiacs.
3. Anaphrodisiacs.
4. Oxytocics (Ecbolics).
5. Galactagogues and
6. Antigalactagogues (see Group IV. Reproductive Tract, 1 and 2).

Certain agents, by improving the general health, act upon the sexual organs, increasing or exciting their venereal propensities when weakened or lost. So far as drugs are concerned they are supposed to stimulate, either directly or by reflex action, a lumbar spinal-genital center, or one located in the cerebrum, or both. Such drugs are called *Aphrodisiacs*. Probably they regulate nerve control and the blood supply to the genital organs.

Conversely, agents may be employed to diminish local circulation or to depress the genital centers and nerves (*Anaphrodisiacs*). The action of both classes is but imperfectly understood. Cold affusions often have a temporary anaphrodisiac effect, but the heightened tone gradually induced finally tends to increase sexual power.

Drugs that increase the expulsive power of the uterus, thus accelerating or facilitating parturition, probably do so (1) by direct stimulation of the specialized unstriped musculature of the womb, exciting contraction, or by (2) indirect stimulation of a special center believed to have its seat in the spinal cord. These drugs are known as *Oxytocics* or *Ecbolics*.

Oxytocics are employed to hasten the uterine action in labor, to prevent or check post-partum hemorrhage, and after parturition, to reduce subinvolution of the uterus.

2. Aphrodisiacs.

Cantharis.
Camphor.
Ginseng.
Volatile oils.
Garlic.
Strychnine (indirect).
Arsenic (indirect).
Phosphorus (indirect).
Alcohol (mental).
Cannabis (mental).
Morphine (small doses) (mental).

3. Anaphrodisiacs.

Bromides.
Iodides.
Salix nigra.
Pulsatilla.
Staphisagria.
Belladonna.
Hyoscyamus.
Ergot.
Stramonium.
Digitalis.
Opium (large doses)
Purgatives.

4. Oxytocics.

Ergot.
Gossypium.
Ustilago.
Viscum.
Pituitrin.
Quinine.

Group VIII. Agents having an Action upon Toxins or Bacteria.

1. Serums (Serum Therapy).
2. Vaccines or Bacterins (Vaccine Therapy).

Serum Therapy is the therapeutic use of the serum of animals immunized against bacterial products or *toxins*. *Toxins* are poisons of undetermined character, produced by pathogenic organisms, and are intensely virulent. By the repeated injections into the blood of small but repeatedly increasing amounts of toxins an animal acquires an *immunity* against them, so that comparatively large doses may be given that animal without detectable harm—amounts which would quickly kill a similar animal not so immunized. *Active immunity*, therefore, is acquired by the repeated administration of the toxin. At the same time that this toxin is being gradually injected the body of the animal is forming "resisting bodies" constituting an *Antitoxin*, a material inoccuous in itself, but which, it is supposed, forms a loose attachment with the toxin, thus rendering it incapable of poisonous effects. From the serum of an animal so treated can be obtained a certain amount of excess antitoxin, of which usually more has been formed than is necessary to control the toxin. This when tested by experimentation upon animals, usually guinea-pigs, and attenuated to a definite standard, is used to control infections produced by the toxin of the identical kind of bacteria which was used in producing the antitoxin. This antitoxin then, used early, is effective in combating the toxin (not the bacteria producing it) causing the disease to be treated. It must be remembered that each antitoxin (with but few exceptions) is effective only as against the toxin used in its production; *i. e.*, diphtheria antitoxin acts only upon diphtheria toxin, tetanus antitoxin against tetanus toxin.

Moreover, it should be fresh and it acts with greatest efficiency when given early during the course of the infection while the toxins are afloat in the blood serum and before they combine with the solid tissues. This is especially true of the tetanus antitoxin, which is probably of little or no value after the toxin has combined with the nerve tissues. The established antitoxins of worth are the *Antidiphtheric Serum* or *Diphtheria Antitoxin*, and probably the *Antitetanic Serum*, if used early.

It will be observed that in the use of antitoxins upon a human being the body of the latter does not have to furnish the immunizing substance, but that antitoxin of the animal immunized against bacterial toxins ready to furnish the immunity required is injected. Space forbids an extensive discussion of Serum Therapy and the reader is referred to special treatises for a consideration of the philosophy of *Immunity*.

Occasionally sera act deleteriously producing so-called *Serum Disease* and *Anaphylaxis*. A few sera are said to act upon certain bacteria as well as their toxins.

Serum Disease (Serum Sickness) exhibits skin rashes, most generally of an urticarial type, pruritus, pains in the joints, malaise, febrile and other unpleasant disturbances. These, however, are transitory. These effects are probably not due to the bactericidal or antitoxic elements, but to the serum, as these phenomena frequently follow the use of normal horse serum. It is well, however, to be cautious in administering sera to those inclined to asthmatic seizures, for such frequently have been found to be especially susceptible to serum sickness.

Anaphylaxis is an acquired exaggerated sensitiveness to subsequent injections of a foreign protein substance into the body, which sometimes follows a primary injection of such a substance. It usually does not occur until after ten days to two weeks, and during that period injections may be given without harm. Even minute amounts of a second injection of the same protein after the ten-day period may prove fatal, and in man this anaphylactic state may persist for years, so that a fatal or dangerous result may follow an injection of the same protein substance many years after the primary injection. Anaphylaxis is also called *hypersusceptibility*, *protein sensitization*, and *Theobald Smith phenomenon*.

Bacterial Vaccines (*Bacterins*) are suspensions or sterilized emulsions of *killed* pathogenic bacteria, in physiologic salt solution, standardized so as to contain a definite number of micro-organisms to the cubic centimeter. They are preserved by 0.3 per cent of trikresol. The bacteria are so modified as not to produce the corresponding disease, yet are so little changed in their protein nature that they stimulate the body cells to the production of antibodies, that will destroy invading living organisms, or in infections already established will invite recovery or establish active immunity. When prepared afresh from the infected individuals they are called *autogenous vaccines;* when not so prepared, "*stock vaccines*"; when several strains of the same bacteria are used they are called "*polyvalent*" or *multivalent vaccines*. When mixed infection is present several strains of the various species of bacteria corresponding to the bacterial infection are employed (*polyvalent mixed* or *combined vaccines*).

Serums and Vaccines are chiefly used subcutaneously, by ordinary and specialized means of hypodermatic administration, or intramuscularly. Good judgment and careful diagnosis should accompany these forms of medication, for they are by no means free from danger to the patient.

It will be observed that there is a marked difference between serum therapy (antitoxins) and vaccine therapy (bacterins) in that the human subject, in case of the former, does not have to furnish its own defensive material, for that is supplied in the immunizing antitoxin injected. With the vaccines, on the contrary, the body is stimulated to furnish its own antibodies. In case of a failure to do so it is questionable whether or not harm may come from the vaccine injected. Moreover, it takes careful diagnosis to determine the type of vaccine to be used, and thus doubtful therapy attends the procedure. Where the organism producing the infection is definitely known, the practice has more to commend it. Thus it is believed that typhoid fever is prevented temporarily at least by the use of the antityphoid prophylactic vaccine. When the disease is established, however, its course does not seem to be shortened or rendered any milder by its administration. Modern Vaccine Therapy should not be confounded with vaccination against small-pox as *dead* material is used in the former, whereas *living virus* is employed in the latter. Vaccines have not as yet become popular in Eclectic therapy; diphtheria antitoxin and antitetanic serum alone have gained advocates in our school, the first especially gaining in favor on account of its undoubted value.

Serums:
Diphtheria Antitoxin;
Tetanus Antitoxin.

Vaccines:
Antityphoid Vaccine.

Group IX. Agents which Supply, Provoke a Needed Glandular Secretion, or Modify Function or Nutrition.

1. Animal Organs.
2. Animal Extracts.

The treatment of disease by the administration of animal organs or their extracts is termed *Organo-Therapy*. While giving promise of therapeutic worth but few of these products have justified the claims made for them—that of supplying deficient secretions, or of provoking the formation of secretions in organs deficient in such secretions. Other properties than those originally suspected have developed from the clinical use of some of them, however, and their employment, with three exceptions, may be said to be in the experimental stage. These exceptions are adrenalin, thyroid extract, and pituitrin (which see).

1 and 2. Animal Organs and Extracts:
Dried Thyroids (and Thyroid Extract).
Adrenalin (Epinephrine).
Pituitrin.

Animal therapy is of very ancient origin, a history of which would be profitable reading. Brought into more recent notice about seventy years ago by Berthold, and later by Claude Bèrnard, the ductless and other glands have assumed importance in therapy, even to being a rich field for the exploitation of biologic quackery. The historic use of testicular juice upon himself by Brown-Sequard is the beginning of modern animal therapy. Now the science of endocrinology or the therapy of the action of gland sub-

stances has taken on a new aspect, the soundness of which remains to be established. It is maintained that the "endocrinous system" (internal secretory system) exerts a powerful stimulating and modifying action "upon anomalies of growth," metabolism, nutrition and excitability of the nervous system, morphogenesia, the causation of dyscrasias, and resistance to intoxications and infections, etc. Preparations representing the internal secretions are employed to arouse or excite or to inhibit certain wayward or inactive functions. To these substances the term *Hormones* has been applied. Hormones are defined as the active principles of the internal secretory glands serving as "chemical messengers to correlate the activities of the body"—positive excitants (stimulators) or negative excitors (inhibitors). Starling defines the hormone "as any substance normally produced in the cells of some parts of the body and carried by the blood stream to distant parts, which it affects for the good of the organism as a whole. The hormones are thus chemical means of correlation of the activities of different parts of the body. Their action may be either the increase or diminution of function, or the alteration of nutrition or rate of growth" (*Hormones*, page 9, by Harrower). The endeavor in the use of hormones is to establish a so-called hormone balance. For a further study of Endocrinology the reader is referred to special treatises on animal therapy.

Group X. Agents having an Antidotal Power over Ingested Poisons.

Chemical Antidotes, etc.

This group includes agents which act chemically or physiologically (antagonistic) upon poisonous substances ingested.

Chemical Antidotes.

(*a*) *For Arsenic:*
Iron hydroxide.
Iron hydroxide with magnesia.
Iron dialysed.

For other Antidotes to Poisons, see "The Management of Acute Poisoning," page 45.

Group XI. Agents having no Pronounced Therapeutic Properties.

1. Coloring substances. (See page 53).
2. Sweetening and Flavoring agents. (See page 51).
3. Vehicles. (See page 51).

1. Coloring Substances.
See also page 53.

Curcuma.
Carmine.
Caramel.
Chlorophyll.
Cudbear.
Cochineal.
Saffron.
Rubus Ideæ (syrup)

2. Sweetening and Flavoring Agents.
(See also page 51).

Sugar.
Honey.
Glycerin.
Sugar of milk.
Saccharin.
Syr. Rubus Ideæ.
Aromatic oils.
Capsicum.
Cardamom.
Catnip.
Cinnamon.
Coriander.
Calamus.
Peppermint.
Spearmint.
Fennel.
Pennyroyal.
Eucalyptus.
Pimenta.
Clove.
Pepper.
Ginger.
Vanilla.
Anise.
Orange peel.
Lemon peel.
Lemon juice.

3. Vehicles.
(See page 51).

XVIII. SOURCES OF DRUG KNOWLEDGE.

Considering the therapeutic side of medicine we are led to assert that perhaps fewer books on materia medica are purchased by fewer physicians of all schools than works bearing upon the other branches of medicine. It is not uncommon for doctors to frequently renew their purchases of books on obstetrics and surgery, and less frequently those on practice. Many monographs are bought, and not uncommonly a system of medicine is purchased at great expense, only to become obsolete matter in a few years and an object of regret to the purchaser. But on the most important topic—the subject of drugs and their uses—too frequently only the text-book used while in college is made to do duty through long years in the practice of his art. Were we to select a working library for a young practitioner, or an old one for that matter, first among the books chosen would be, not one book but several on the practice of medicine and materia medica and therapeutics. Many practitioners begin and end with one book, in which the reader hopes to find included all that has been written concerning medicines and their uses. He fails to recognize that while there are many works touching these topics in a general way, no one as fully presents them as a collection of books, each devoted to some particular phase of the subject. He who purchases only a pure materia medica, searches in vain for some fact concerning a medicine, and is disappointed that the writer has failed to include that fact—perhaps therapeutic—or some other he is seeking. He is the doctor who so frequently asks, "What is the best work on medicines?" not realizing that what he desires must be looked for in one or the other of five classes of books. It is just this type of practitioner who finally comes to a realization that there is a difference between materia medicas, pharmacopœias, dispensatories, formularies, and works upon therapeutics alone. Let us briefly differentiate:

A **Materia Medica** is a work describing the characteristics of vegetable, chemical, and animal drugs, giving names and synonyms, chemical formulæ and equations, describing the crude drug and noting the microscopic appearance, giving tests to identify sophistications and adulterations, etc. Preparations and doses are mentioned, and brief therapeutic and toxicologic notes are usually given.

More generally works on materia medica are combined with therapeutics, and these are called works on "Materia Medica and Therapeutics." This is the usual type of book purchased by the doctor. It may embrace all that a specific materia medica includes (some lean most strongly to therapeutics), and also extensively cover the so-called physiologic, chemical, and toxicologic action, as well as the therapy of the drugs considered. Such works are usually selective and do not cover all the drugs in use, thus differing from a dispensatory. A materia medica of this sort in the regular school most frequently considers chiefly the official drugs, though some have overstepped these bounds and include such agents as appeal to the author. A materia medica should show strongly the individuality of its author, and what he includes in it is usually such matter as he has personal knowledge of or which meets his approval. Here it differs from a dispensatory, which is designed to give a compilation that makes it a book of reference.

A **Formulary** is a collection of working formulæ for the preparation of medicines and may or may not give the therapeutic properties of such compounds. If the latter are given, they are very briefly noted and usually in condensed general therapeutic terms, as cathartic, etc. Some books of formulæ are little more than a collection of prescriptions, though they generally differ in directions concerning the preparations of common stock medicines rather than prescriptions for specific uses. A popular work of this kind that served its purpose for many years was "Griffith's Formulary."

The National Formulary of to-day is a semi-official work which includes standard formulæ and directions for the making of preparations used largely over the country, or in some restricted localities of our Union, but which are not included in the United States Pharmacopœia. The National Formulary is prepared by a committee of the American Pharmaceutical Association, and is therefore a semi-official work, it being a legal standard under the National Pure Food Law. Like other formularies, it is of more use to druggists than to doctors, though the latter need it to familiarize themselves with the names and contents of its preparations, should they desire to dispense or prescribe them. The National Formulary includes several Eclectic preparations, but unfortunately has seemingly been careful not to list them under the commonly employed Eclectic names, thus withholding credit where credit is due. National Formulary preparations are designated by the abbreviation *N. F.*

The United States Pharmacopœia is the official manual of standards for the identification of drugs known as official in this country and is revised every ten years by a committee of delegates from the American Pharmaceutical Association, medical and pharmaceutical colleges, and medical and other pharmaceutical associations, and the Army, Navy, and Marine Hospital services sitting in decennial convention. It is accepted as the standard concerning the quality, uniformity, purity, and integrity of the drugs and chemicals embraced. It describes them, gives tests, notes the usual adulterants and sophisticants, prescribes the limitation of impurities, and directs means of preservation of drugs. It does not give therapy in any form except as may be inferred from the titles of some of its preparations. It is the standard guide to the making of such preparations as are official, and is indispensable to the manufacturing pharmacist and the dispensing druggist. Up to the eighth edition doses were not given, but since then each issue includes the *average dose* of a drug, chemical, or preparation, expressed in both metric and common weights and measures.

In the absence of statutory provision regulating the quality and character of a medicine, the dictum of the United States Pharmacopœia is usually accepted in the courts of law. The National Food and Drugs Act (1906) makes the United States Pharmacopœia and National Formulary standards for drugs. Though the Pharmacopœia and the National Formulary are recognized by the Federal Government as authoritative, the government has no control over their formulation or publication.

Drugs and preparations bearing the official title must conform in all respects to the provisions of the Pharmacopœia. The abbreviation *U. S. P.* stamps such a drug or preparation as official.

A **Dispensatory** is, primarily, a commentary upon pharmacopœias (United States as well as some foreign), but is broad enough in scope to include also every known medicinal or pharmaceutical article and its most important preparations. It is the most comprehensive of single works upon medicines and their uses. In it the doctor may find the official and non-official and common names and synonyms of drugs and chemicals; the chemical formula, if a chemical; the botanical origin, if a vegetable or vegetable product or educt. If a vegetable substance is under consideration, the botanical source, a botanical description of the plant yielding the drug, a description of the parts used, marks of identity, and a discussion of sophisticants and adulterants are presented. If a chemical is the subject of comment, the various processes of production are noted and criticized or commended. Preparations are listed and formulæ given for compounding them. Related plants, products, and educts and preparations are included, and doses—maximum and minimum—are given in both the metric and common weights and measures. Tests of identity and, in some instances, of strength and of microscopic appearances are fully but concisely stated.

The action of medicines—physiologic, toxic, and medicinal—is fully but briefly given, and in the Eclectic work, *The American Dispensatory*, the specific indications for medicines are fully presented.

It will readily be seen that a dispensatory is in reality an encyclopedia of drugs and their uses. While no words are wasted and loose construction scarcely permitted on account of the vastness of material which must be included in as brief a compass as possible, it still remains for the doctor the most useful and comprehensive of books on the general study of drugs and therapy.

A dispensatory is not necessarily official, nor is it necessarily, in this country, the legal criterion. In the case of the Eclectic work, however, it has the official endorsement of the National Eclectic Medical Association. It is always a private work, owned and controlled either by its authors or publisher or other interested party.

While a dispensatory includes all sides of the study of medicines and their uses, it must be borne distinctly in mind that, so far as the preparations included and the uses are concerned, the work is necessarily a compilation, and while the author or authors are supposed to exercise great care and judgment concerning the matter included, such matter may not necessarily have their endorsement or full approval. Being encyclopædic in character, it must necessarily include largely the views of others than the authors on debatable questions and recommendations. Where selection is possible, the authors present the views and opinions of investigators and practitioners upon whose judgment they can rely. Dispensatories are indispensable to both druggists and physicians.

This, then, is the group of books that the doctor must go to for his knowledge of medicines. The Pharmacopæia, the Formularies, and the National Formulary are relatively of little value to him. But every practitioner of medicine should have two or three good works on materia medica and therapeutics, and renew them frequently, thus getting the advantage of the viewpoints of the several authors. For general encyclopædic matter, he cannot justly deprive himself of the advantages of a dispensatory.

PART II.
Individual Drugs.

ABIES.

The bark and prepared resinous exudate of *Tsuga canadensis*, Carrière (*Abies canadensis*, Michaux; *Pinus canadensis*, Linné). (Nat. Ord. Coniferæ.) A well known and handsome evergreen tree of the forests of Northern United States and Canada.

Common Names: Hemlock, Hemlock Spruce.

Principal Constituents.—The oleoresin Canada pitch, and a volatile oil known as Oil of Hemlock or Oil of Spruce; that from the leaves is known as Pine-needle Oil, and contains *pinene*, bornyl acetate, and cadinene; the bark contains a large amount of tannic acid.

Preparations.—1. *Specific Medicine Pinus. Dose*, 5 to 60 drops.
2. *Oil of Hemlock. Dose*, 1 to 5 drops.

Specific Indications.—General asthenia, with feeble digestion, vascular weakness, and pale and relaxed mucosa; broncho-pulmonic irritation, with profuse secretions; coughs and colds; pyrosis with gastric irritation, vomiting, and diarrhœa. Contraindicated in inflammations.

Therapy.—*External.* A strong decoction of the bark is a satisfactory astringent for the checking of leucorrhœa and a good local application of this type for aphthous and other oral ulcerations, gangrenous ulcers, prolapsus ani and prolapsus uteri. The specific medicine on cotton may be applied to the cervix uteri to heal abrasions and control discharge. The oil may be used as an embrocation for painful and swollen parts, and by spray in nose and throat disorders attended by mild catarrhal symptoms. It enters into many proprietary and semi-proprietary preparations for the treatment of coryza, congested turbinates, and ulcerations of the nasal fossæ and throat. The oil dropped upon boiling water is a time-honored inhalation for croup. It has also been used to advantage in some forms of eczema, particularly the weeping type.

Internal. Pinus Canadensis, the name under which most of the alcoholic preparations pass, is mildly stimulant, antiseptic, and useful where an astringent remedy is desired in conditions of relaxation, with pallid mucosa. In small doses, the specific medicine may be employed in gastric irritation and in that of the urinary organs, in both of which there is an excess of mucous secretion. As a remedy for passive hemorrhages it has little to commend it, though it is not wholly without effect, acting much like but with less power than the oil of erigeron and similar preparations. Both the specific medicine and the oil may be incorporated into cough medicines, to be used where there is excessive secretion of mucus and the cough is largely precipitated by a feeble and relaxed state of the uvula and fauces.

ABSINTHIUM.

The flowering tops and leaves of *Artemisia Absinthium*, Linné (Nat. Ord. Compositæ); Europe, Siberia, Barbary, Newfoundland, and the United States; naturalized in New England; cultivated. *Dose*, 10 to 20 grains.

Common Name: Wormwood.

Principal Constituents.—A volatile oil (*Oleum Absinthii*), containing principally absinthol ($C_{10}H_{16}O$) and a crystalline bitter *absinthin* ($C_{15}H_{20}O_4$).

Preparations.—1. *Infusum Absinthii*, Infusion of Absinthium (℥j to Oj). *Dose*, 1 to 2 fluidrachms.
2. *Oleum Absinthii*, Oil of Wormwood. *Dose*, 1 to 5 drops.

Action.—Both oil of wormwood and extract of absinth act as nerve depressants upon man. Small doses at first stimulate, larger ones produce headache, and still larger doses induce cerebral disturbances and clonic hysteroidal convulsions. Victims of *absinthism*, a vicious form of drunkenness, are subject to disturbed rest, with disagreeable dreams, and morning sickness and vomiting. A chronic intoxication ensues that is more fearful in its effects than that resulting from the abuse of alcoholics. Epileptoid attacks are common, physical and mental force is seriously impaired, and virile power is lost in the male, while a premature menopause is a common result in the female. It is also said to produce a peculiar hyperesthesia, most marked in the integument of the hypogastrium. The French liquer *Absinthe*, which is a viscous alcoholic cordial, and *Wermuth*, a German beer, both depend upon wormwood for their activity.

Therapy.—*External.* Absinthium, steeped in vinegar and water, makes an admirable hot fomentation for sprains, bruises and local inflammations. It should not be applied to abraded surfaces.

Internal. Small doses of absinthium stimulate the appetite and give tone to the gastric membranes, thus favoring digestion. For this purpose it is sometimes useful in atonic dyspepsia; especially in that form due to alcoholic excesses. Large doses irritate the stomach and give rise to increased action of the heart. Though less agreeable than santonin, it may also be used for the expulsion of the intestinal parasites—Ascaris vermicularis and Ascaris lumbricoides. The oil may be given in doses of 1 to 5 drops.

ACACIA.

The dried gummy exudate of *Acacia Senegal*, Willdenow; and of some other African species of Acacia. (Nat. Ord. Leguminosæ.) Eastern Africa (Kordofan, chiefly), and Western Africa north of river Senegal.

Common Names: Acacia; Gum Arabic.

Principal Constituents.—*Arabin* ($C_{12}H_{22}O_{11}$—Arabic acid) in combination with salts of calcium, magnesium, and potassium.

Description.—Tears or fragments of a nearly odorless, translucent white, yellow-white, to pale amber-colored exudate, having a rather insipid and mucilaginous taste; soluble in water, but insoluble in alcohol.

Preparations.—1. *Mucilago Acaciæ*, Mucilage of Acacia. *Dose*, 1 to 4 fluidrachms or more.
2. *Syrupus Acaciæ*, Syrup of Acacia. *Dose*, 1 to 4 fluidrachms or more.

Action and Therapy.—Acacia is largely employed in the preparation of pills and in the emulsification of oils and resins. It is demulcent and probably slightly nutritive. In the form of a solution or mucilage it is an agreeable lenitive for irritated and inflamed membranes, and for this purpose is frequently used in medicinal preparations for coughs, colds, hoarseness, pharyngitis, gastric irritation and inflammation, diarrhœa, dysentery, ardor urinæ, etc. It also forms a good mucilage in which to suspend heavy and insoluble powders. When the stomach is irritable in low fevers and in pulmonary tuberculosis, a half ounce of acacia may be dissolved in 5 fluidounces of water, sweetened with sugar, and given in tablespoonful doses occasionally to relieve the sense of hunger when but little food can be taken. Mucilage of acacia is soothing to burns and scalds of the mouth and alimentary canal, and may be used as a demulcent after poisoning by irritant and corrosive poisons. Acacia may be given freely and at pleasure, in the form of powder, troches, mucilage, or syrup, as desired.

ACETANILIDUM.

Acetanilid, Acetanilide, Antifebrin.

The monoacetyl derivative of aniline (Formula: $C_8 H_9 ON$).

Description.—Shining mica-like, colorless, crystalline scales, or a white crystalline powder; permanent, odorless, and having a slight burning and subsequently benumbing taste. Readily soluble in alcohol, chloroform, and ether, and in boiling water; less soluble in cold water. *Dose*, 2 to 8 grains; usual dose, 3 to 5 grains.

Specific Indications.—Severe frontal and neuralgic headaches; diffused headache of nervous origin; congestive and reflex headaches when not due to gastric disorders or faulty digestion; sick headache; acute pain, with high temperature, provided the heart and kidneys are in good condition. The small dose preferred.

Caution.—Acetanilid should be avoided in all cases of fatty degeneration, particularly of the heart, kidneys, and liver, and in renal irritation and congestion.

Action.—In health the effects of acetanilid are less pronounced than in disease, especially fevers. Small doses produce a quieting effect, sensory sedation, and the secretions of the skin and kidneys are increased. Blood pressure is first elevated, then depressed; and cardiac action is decreased in frequency. In all doses the tendency is toward depression rather than stimulation of the circulation.

It is claimed by some that the reduction of temperature when fever is present is due to the reduction of hæmoglobin into methæmoglobin and its consequent interference with oxidation causes the cyanosis. Hare, however, attributes it to a decrease of heat-production mostly and to an increase of heat-dissipation, the exact cause of both not being known. Very large doses increase the urea and uric acid in the urine, destroy the red corpuscles, decrease the alkalinity of the blood, liberate hæmoglobin, and impart to the urine a deep-brown or chocolate color, the latter being due to the methæmoglobin formed. Acetanilid is quickly absorbed and quickly eliminated, being observed in the urine in two hours and passing completely from the body by the renal route in the form of para-amidophenol sulphate. Before death complete motor and sensory paralysis occurs; and though the heart is arrested in diastole, death is attributed to centric respiratory paralysis.

Toxicology.—Large doses produce serious symptoms, depressing powerfully the nervous and circulatory systems. Weakness, slight headache, sounds in the ears (tinnitus aurium) and general malaise are experienced together with a sense of coldness. A characteristic livid cyanosis of face and body occurs, differing somewhat from ordinary cyanosis, and the deepened color is probably intensified by the methæmoglobin produced in the blood. First the head and then the body is profusely bathed in sweat, respiration becomes slow and shallow, the pulse soft, slow, and finally very weak, and collapse and death take place. Even five grains have been said to have caused collapse in one case and death in another. Other symptoms which have occurred from varying doses of the drug are a peculiar measles-like eruption, anæsthesia, coma, and loss of reflexes; nausea, vomiting, and diarrhea is claimed by some, denied by others.

In case of collapse or poisoning, external heat, friction, and artificial respiration should be used, and hypodermatic stimulation by means of ether, alcohol, atropine, and strychnine; oxygen should be given by inhalation to combat cyanosis and sustain respiration.

Therapy.—*External.* Acetanilid is a local hemostatic and as such may be used in epistaxis and capillary oozing after operations and injuries; as it is also antiseptic it may be applied to wounds, and it makes a fairly good topical dressing for chancre and chancroid. Applied to the gum it relieves toothache where there is no cavity. For all local uses it should be employed upon small areas only and in quantities within the ordinary internal dosage, for poisoning is very likely to occur from absorption.

Internal. Acetanilid was originally introduced as a remedy for pyrexia, and indeed by many its chief action is asserted to be antipyretic. It has, however, fallen into almost complete discredit on account of the dangerous collapse and cyanotic condition which it often produces. It should have no place in fevers of a low or typhoid type, and we are admonished that while excellent results have been obtained in scarlatina, it should be carefully watched on account of the numerous instances of drug-intoxication observed from its use in children. Practically no use is made of the drug in febrile states by Eclectic practitioners, the exceptions, perhaps, being in puerperal fever, rheumatic fever, uncomplicated with cardiac disorders, and in erysipelas, in all cases to be used only when the temperature is excessively high. Even in these tepid sponging or the special sedatives are to be preferred. While capable of subduing many of the unpleasant features of la grippe, it has frequently proved detrimental, and had better be dispensed with in favor of macrotys, gelsemium, bryonia, or aconite or veratrum when these are indicated. It may be used cautiously to control the hectic fever of phthisis. If excessive sweating is produced it should be discontinued. Acetanilid is of considerable value in acute inflammatory rheumatism, especially in cases in which the salicylates are said to be admissible, but fail to do any good. It reduces the swelling and alleviates the pain. It should not, however, be used for any length of time, nor in large doses. It is particularly useful when the rheumatic affection is ushered in with sharp and severe pain, in which case it should be preferred to opiates. Intense pain from muscular spasm is quickly relieved by it.

Acetanilid is used in Eclectic practice mostly in nervous disorders characterized by spasm and pain, for it is decidedly antispasmodic and analgesic. Very small doses restrain whooping-cough, but its action should be closely guarded lest symptoms of collapse arise, and the drug cyanosis should be carefully differentiated from the cyanotic seizures naturally occurring during attacks of cough. It should be employed only when other agents fail and in robust children. The pain and spasms of gastralgia and gall-stone colic are often mitigated by it, but it is less effectual than morphine. By some it is valued in spasmodic asthma, chorea, and especially in epilepsy, though Eclectic therapy offers safer remedies. It is of the most value in headaches of nervous origin. In migraine, neuralgic and rheumatic headaches, sick headache, reflex headache from uterine disorders, menstrual headache, and facial and sciatic neuralgia its effects are

most gratifying. In all these cases the condition of the circulation and kidneys should be ascertained previously, for it is dangerous and should never be used where there is cardiac embarrassment, fatty degeneration or ventricular dilatation, or renal irritation or congestion. For those neuralgias arising from changes in the spinal cord; in the pains of tabes dorsalis and locomotor ataxia acetanilid acts surprisingly well and has largely supplanted morphine and its congeners as a pain reliever. Indirectly, by relieving acute and subacute pain, it plays the part of a hypnotic, or rather prepares the way for a refreshing sleep. Acetanilid is best administered in powder, capsule, or cachet; owing to slow solubility—or sudden late disintegration—it should not be given in the form of compressed tablets. It should not be given with caffeine, which seems to increase its toxic power.

ACETPHENETIDINUM.

Phenacetin, Acetphenetidin.

A para-amidophenetol acetyl derivative. (Formula: C_{10} H_{13} O_2 N.)

Description.—Glistening white scales or a fine crystalline powder without odor, and having a feebly bitter and slightly benumbing taste. Permanent in the air; soluble in alcohol, and less so in boiling water, and almost insoluble in cold water (about 1300 parts). *Dose*, 2 to 8 grains; usual dose, 5 grains.

Specific Indications.—In sthenic conditions only: Severe muscular pain; pain from congestion; neuralgic pain; nervo-congestive or catarrhal headache; high temperature; preparator for quinine administration.

Action and Toxicology.—Phenacetin is the best and least toxic of the coal-tar antipyretics. Ordinarily safe in proper doses, in large amounts, and sometimes even with the regulation doses, it is capable of producing great depression and dangerous collapse. Toxic symptoms are violent vomiting, chills, deep cyanosis, profuse sweating, marked reduction of the temperature, quickened respiration, sleepiness, and almost complete stoppage of the heart's action. No cases of death in man have been directly traceable to phenacetin.

Phenacetin acts as a nerve sedative, especially upon the sensory tracts of the spinal cord. Only overdoses appreciably affect the circulation. The urine becomes dark yellow or chocolate colored, the blood blackish from the formation of methæmoglobin, and bodily heat is lowered by decreasing heat-production and increasing heat-dissipation. The urine reacts to Fehling's solution, and the drug probably is converted in the body into para-amidophenol sulphate. Any depression from its use should be promptly met by heat and cardiac and respiratory stimulants.

Therapy.—Phenacetin is analgesic, antipyretic, diaphoretic, and a nerve sedative. In small doses it may be used in fevers when the temperature is very high, and it gives comfort in typhoid fever, but does not in the least shorten the course of the disease. In a disease so prone to disorganization of the blood and marked nervous and circulatory depression the use of any of the coal-tar antipyretics is unwise, save only in an occasional case when at the onset very great heat and unrest are experienced; then a single dose or two may be given. The sweating produced by this drug is not as profuse as with antipyrine, nor is it so apt to produce the cutaneous eruptions and aural symptoms so common to the allied antipyretics. In

two-grain doses it controls the high temperature in phthisis pulmonalis, without producing excessive diaphoresis. In local congestions and inflammations it reduces swelling in proportion as it controls the pain. An important use for phenacetin is to render the skin and tongue moist and the nervous system calm preparatory to the use of quinine. In this way only does it benefit in malarial fevers. As a general antipyretic its use is not favored by Eclectic physicians, who prefer, where antipyresis is at all permissible, to employ the small doses of the special arterial sedatives, and sponging with tepid water.

Phenacetin promptly controls pain. It acts best when pain is independent of structural change, and may be used in both acute and chronic conditions. If small doses do not relieve, larger ones are also apt to fail. It is especially valuable in nervo-congestive and catarrhal headaches, and for headache from eyestrain and frontal sinusitis, though it is less effective in the latter than codeine. For the relief of muscular pain in la grippe it is prompt, but has been recklessly used. It is useful to control pain in tonsillitis, gastralgia, and that of febrile and inflammatory diseases. Acute rheumatism is made more endurable by it, though it possesses no inherent antirheumatic power, nor should it be given when there is great debility or any circulatory embarrassment. Its analgesic properties are taken advantage of in dysmenorrhea, in various types of neuralgia—especially facial, sciatic, and intercostal, and it softens the distressing pains of pleurisy.

Phenacetin relaxes muscular spasm; lessens the irritability of the congested larynx in whooping-cough and stridulous laryngitis and spasmodic asthma; and it has benefited some cases of hysteria and epilepsy.

Owing to its sparing solubility phenacetin is best given floated upon water, or in capsule; never in tablets which are difficultly disintegrated. In all instances it is *contraindicated by debility.*

ACHILLEA.

The whole plant *Achillea Millefolium*, Linné (Nat. Ord. Compositæ); a common wayside and field herb in North America and Europe.

Common Names: Yarrow, Milfoil, Thousand Leaf.

Principal Constituents.—The bitter alkaloid *achilleine* (C_{30} H_{38} N_2 O_{15}), *achilleic acid* (aconitic acid); a volatile oil, tannin, and potassium and calcium salts.

Preparation.—*Specific Medicine Achillea. Dose*, 5 to 30 drops.

Specific Indications.—Atony and relaxation of tissue, with free discharges; passive hemorrhage.

Action and Therapy.—Achillea is astringent and tonic. Its chief virtues are shown in its occasional control of passive menorrhagia due wholly to atony, and not to the presence of tissue change or destruction. It sometimes relieves hematuria, and is soothing to the urinary tract.

ACIDUM ACETICUM.

Acetic Acid

An aqueous solution of not more than 37 nor less than 36 per cent of Acetic Acid (C_2 H_4 O_2).

Description.—A sharply sour, clear and colorless liquid, having a vinegar-like odor. It acts strongly on litmus, turning it red. It mixes with water or alcohol in all proportions.

Preparation.—*Acidum Aceticum Dilutum*, Diluted Acetic Acid. An aqueous dilution containing about 6 per cent of acetic acid. *Dose*, 10 to 60 minims well diluted.

Related Acids.—1. *Acidum Aceticum Glaciale*, Glacial Acetic Acid (nearly pure, or 99 per cent acetic acid, C_2 H_4 O_2). For local use only.

2. *Acidum Trichloraceticum*, Trichloracetic Acid (99 per cent pure). For external use only.

Specific Indications.—Deep redness of tongue and mucosa. Antidote to poisoning by alkalies.

Action.—Acetic Acid is a mild irritant to the skin unless contact be prolonged, then it blisters and finally destroys the epiderm. Mucous membranes are first whitened by it, and then become brown. If a large dose be swallowed there will follow violent burning in the stomach, with vomiting and diarrhœa Fatal perforation has occurred from it. When *diluted* it reduces temperature and slows the pulse. Used continuously, changes occur affecting the alkalinity of the blood and crippling the corpuscles. When acetic acid kills, it is by paralysis of the heart.

Glacial Acetic Acid may produce convulsions and coma, followed by death; when not fatal, gastro-enteritis results.

In poisoning by any form of acetic acid, weak alkaline solutions, lime water, or soapsuds, or milk should be administered immediately, and the stomach pump or emetic be used. The after treatment should be lenitive—the free use of milk and mucilaginous drinks, and opiates to relieve pain.

Therapy.—*I. Glacial Acetic Acid. External.* Glacial Acetic Acid may be used as an escharotic where limited action is desired, as upon corns, warts, venereal condylomata, papillomata, lupus, and nasal polypi, and hypertrophies. Small epitheliomata have been removed by it, but with no assurance against a recurrence. Some value it when lightly applied to chancre and syphilitic ulcers. It is of especial worth for the local treatment of ringworm and other forms of tinea and scald-head. Sluggish and fœtid ulcers may be stimulated by it, and a mixture of equal parts of the acid and chloroform has been advised to limit the extension, and to promote the growth of hair, in alopecia circumscripta. The spots should be lightly touched daily. In the use of this acid, if much pain is caused, it may be diluted to the point of toleration. In all conditions, however, it must be very carefully applied by touching the parts with a pencil dipped in the acid, and with the remembrance that it attacks flesh powerfully and may produce a painful sore.

II. Acetic Acid. External. Antiseptic, refrigerant, astringent, and deodorant. This acid, in small amounts, may be added to vessels holding typhoid and tubercular discharges to destroy their offensive odor. Injected into small nasal polypi it causes them to shrivel and drop away. Should they suppurate, borax or asepsin solutions may be used to cleanse and deodorize the nasal surfaces. It has been used upon epithelioma upon the theory that it is "the only agent that will liquefy and disorganize cancer cells"—an extravagant claim—; it should only be attempted upon those who refuse to be operated upon, and then with no assurance of permanent relief. Inhaled it sometimes relieves fainting, headache, and hoarseness.

III. Diluted Acetic Acid (or its equivalent, Vinegar). *External.* Either diluted acetic acid or vinegar may be used to check moderate hemorrhages, as epistaxis, bleeding from superficial wounds, or from hemorrhoids and in postpartum hemorrhages. A vinegar bath is refreshing, cooling, and stimulant, as well as constricting to the skin, and is often agreeable in fevers, inflammations, contusions, dermatitis, and sunburn, and may

prevent the occurrence of bed sores. Used in this manner it contracts the local blood vessels, and it sometimes relieves colliquative sweating. Applied full strength it often relieves the itching of urticaria, and when not desirable to use glacial acetic acid, may be applied to ringworm. Both the diluted acid and vinegar may be used in local poisoning by the caustic alkalies; and inhaled, it alleviates the nausea and vomiting following the use of chloroform as an anæsthetic. Vinegar, diluted, relieves to some degree the distress of the mouth and throat occasioned by the administration of aconite; and it is also said to antagonize the local effects of carbolic acid. Hot diluted vinegar and salt and red pepper is an effectual though severe domestic remedy for sluggish and congested sore throat. Very weak solutions of vinegar are among the most effectual means of dislodging seat-worms (Ascaris vermicularis). Vinegar stupes make a comforting application to bruises and sprains.

Inhaled by volatilization from boiling water the vapor of vinegar gives relief in quinsy, acute laryngitis, and in spasmodic croup. It aids also in membranous croup, which is practically laryngeal diphtheria, by loosening the membranes and favoring freer breathing. It must not, however, be pushed to the extent of exhausting the already debilitated patient by the overheating induced. Sometimes this use of it is excellent to control the dry cough of bronchitis and of measles.

Internal. The internal use of vinegar to reduce obesity is to be condemned on the ground that it does so at the expense of disordering digestion and nutrition. It is sometimes agreeable in fevers when an acid is indicated, and in small quantities may be added to meat broths, or given simply diluted with water. It is among the best antidotes to poisoning by the caustic alkalies and has the advantage of being at once obtainable in every household. Ellingwood asserts that it is an antidote to carbolic acid. Suitably diluted, it may be freely administered in hematemesis. Well diluted, it may be used sometimes to allay the thirst and colliquative sweating of phthisis. We recall the gratefulness of a vinegar beverage for field workers in hot weather, composed of vinegar, water, and ginger, slightly sweetened with molasses. This is more refreshing and apparently safer as a harvest drink than large draughts of water, and certainly to be preferred to the baneful effects of hard cider.

RELATED ACID.

Trichloracetic Acid (*Acidum Trichloraceticum*).—When chlorine acts upon acetic acid three modifications of chloracetic acid are produced, accordingly as the hydrogen atoms are replaced by one, two, or three atoms of chlorine—viz., mono-, di-, and trichloracetic acids. The latter forms colorless deliquescent soluble crystals having a faintly pungent odor. In full strength to 50 per cent dilutions trichloracetic acid is used as a rapid cauterant. It is said to be less painful than most escharotics, and such pain as might be caused upon mucous tissues may be forestalled by first applying cocaine or its congeners. It closely resembles nitric acid in action, penetrating deeply without very much inflaming the surrounding tissues, and forms a small, dry, and smooth whitish eschar which soon falls, leaving a granulating and rapidly healing surface. Very little contraction takes place, and the scar is inconsiderable. Trichloracetic acid may be used upon papillomata, warts, venereal condylomata, lupus, vascular nævi, and various neoplasms; and under proper conditions to destroy the remaining bases after removal of exuberant growths in the middle ear. The neighboring tissues, when possible, should be protected by collodion, and the acid applied directly in crystal, or if liquefied, by means of a glass rod.

ACIDUM ACETYLSALICYLICUM.

Aspirin; Acetyl-salicylic Acid.

Description.—White crystalline needles having a disagreeable, sourish taste, soluble in 300 parts of water and in alkaline solutions. *Dose*, 5 to 15 grains; usual dose, 5 grains.

Specific Indications.—Rheumatic and neuralgic pain.

Action.—This agent is used in place of the salicylates, and is said to have no irritant effect upon the stomach and to be less apt to provoke tinnitus aurium. In some persons, however, it has caused profuse sweating, urticarial eruptions (including a dangerous swelling of the glottis), and collapse. During the great influenza epidemic (1918-19), many serious results and even deaths were afterward believed to have been due to excessive dosage of aspirin and other synthetics. Like salol, this drug does not dissolve in the stomach, but disintegration takes place in the intestinal canal. Many cases of "aspirin habit" have been reported.

Therapy.—Aspirin is used as an intestinal antiseptic, and instead of the salicylates in gouty and lithæmic conditions. Its chief use, however, is to relieve pain in neuralgias and acute rheumatism, and particularly in headaches of the neuralgic or nervous type. Unfortunately it is one of the drugs which has been taken up and used recklessly by the laity for almost any painful condition and often with disastrous effects. The blame can be laid at the doors of the physicians and druggists who have thoughtlessly, or with commercial hopes, placed an unguarded and limited knowledge of the drug before the people. If symptoms of salicylism (ringing in the ears, or profuse sweating, or urticaria) occur, its use should be discontinued.

Aspirin should not be dispensed with quinine or its salts, lest a poisonous compound—quinotoxin—be formed. Recently this has been denied.

SUBSTITUTE FOR ASPIRIN.

Novaspirin (*Methylene-citryl-salicylic acid*) contains about 62 per cent of salicylic acid. It has been introduced for use in place of aspirin because it is less irritant than that body. It is a white powder, readily soluble in alcohol, but almost insoluble in water; it has no odor, but a feebly acidulous taste. In the alkaline media of the intestines it becomes dissociated into salicylic acid and methylene citric acid. As it passes through the stomach unchanged it is used interchangeably with aspirin or salol where ordinary salicylates cannot be employed on account of the gastric irritation produced. Novaspirin has been recommended in neuralgias, neuralgic headache, tonsillitis, intestinal fermentative disorders, and in muscular and articular rheumatism. The free use of large doses of both apsirin and novaspirin are accused of doing great damage in the epidemic of septic influenza of 1918-19. Milder drugs seem preferable in la grippe and epidemic influenza than these too frequently employed synthetics. The dose is from 5 to 15 grains; not more than 60 grains a day should be given, even in acute rheumatism. Its use should be discontinued if ringing in the ears (symptoms of salicylism) occurs.

ACIDUM BENZOICUM.

Benzoic Acid.

An acid obtained by sublimation from benzoin, or synthetically manufactured. (Formula: $C_7H_6O_2$).

Description.—Lustrous scales or friable needle crystals, white and odorless (synthetic acid) or white or yellowish with faint odor of benzoin (natural acid). The latter becomes darker in color when exposed to light. Both have a pungent taste. It dissolves easily in alcohol, ether, chloroform, and in fixed and volatile oils; and less readily in turpentine; more sparingly in water. *Dose*, 1 to 30 grains; the smaller doses are usually preferred.

Specific Indications.—Excessively alkaline urine; phosphaturia; vesical irritability, with alkaline urine; fermentative urine; brain-fag, with phos-

phaturia; "irritation of the sympathetic and spinal system of nerves with uric acid deposits" (Scudder).

Action.—Benzoin and benzoic acid and its salts act quite similarly. According to concentration all are irritant to the mucosa, the vapor particularly exciting a flow of bronchial mucus. In many respects the acid resembles salicylic acid both in its local and internal effects. Its antibacterial power is about equivalent to that of the latter. Large doses cause nausea and vomiting, the pulse is somewhat accelerated, and the secretions of the mucous membranes by which it is excreted are rendered more or less antiseptic and antiputrefactive. A large part of it is eliminated by the urine as hippuric acid, though some unchanged benzoic acid is also voided. The effect is to both disinfect and acidify the urine, the secretion of which is also augmented, probably through a stimulating action upon the cells of the kidneys.

Therapy.—*External.* As a constituent of benzoinated lard, or of the compound tincture, benzoin is frequently used in local disorders. Equal parts of the compound tincture and glycerin (or similar preparations of various strengths) is a valuable lotion for chapped hands and lips, chilblains, cracked nipples, fissure of the anus, etc., and as an antipruritic and healing application in urticaria and eczema. In the light of present views of antisepsis, the discarded use of the compound tincture as a surgical dressing has been justifiedly revived. By inhalation, the compound tincture is valuable in acute laryngitis, pharyngitis, bronchial catarrh, and to relieve the hoarseness due to irritation of the vocal cords of singers and speakers. When this method is employed the tincture (2 or 3 drachms) should be added to hot water (1 pint) in a vessel with a large opening and inhaled by shrouding the head over the rising vapor. Atomizers cannot be used, as the gum easily obstructs the tubes. Benzoinated lard, owing to its non-rancid and antiseptic qualities, forms the unctuous base of many ointments for local use in various skin diseases.

Internal. Benzoic acid and the benzoates (sodium and ammonium) are used chiefly in urinary disorders with alkaline urine. By checking fermentation and rendering the ammoniacal urine acid, it quiets irritation, pain, and chronic inflammation, and promotes a better and freer flow of urine, and overcomes enuresis, dribbling, and urgent insistence to urinate when but small quantities are to be voided. It also dissolves phosphates and dissociates the particles of cystic calculi, being especially useful in uric acid gravel when the urine is strongly alkaline and fermentative, whether a suppurative state be present or not. By its antiseptic action it is of marked value in pyelitis. When gonorrhœa is aggravated or prolonged by putrefactive urine it aids by its corrective power. It also probably prevents the formation of calculi by rendering the urine acid and by converting at least a part of the alkaline material into ammonium hippurate. It is useful in the dribbling of urine in old men, when due to excessive alkalinity, and sometimes relieves the urinal incontinence of children, especially if due to gravel. It is the remedy for chylous urine, and reduces or wholly abolishes the albumen in cyclic albuminuria, but has little or no effect upon that due to chronic renal inflammation.

Scudder suggested benzoic acid as a specific in "irritation of the sympathetic and spinal nervous systems, with uric acid deposits," and in brain exhaustion in mentally over-worked individuals, with phosphaturia. By its undoubted power over intestinal bacteria, and the reduction of the amount of indican in the urine, benzoic acid and its salts are useful in intestinal putrefaction and intestinal catarrh of children and in jaundice. The benzoates should not be used in health, as in the preserving of foods, on account of their retarding effects upon the activity of the digestive enzymes.

Benzoic acid is a constituent of Camphorated Tincture of Opium, well known as Paregoric. It has also been largely used in chronic respiratory catarrhs. Its use in diphtheria, erysipelas, and allied infectious diseases, for its antizymotic effect, as employed by German physicians, is logical, but has found few followers in this country.

ACIDUM BORICUM.

Boric Acid, Boracic Acid. (Formula: H_3BO_3).

An acid derived from deposits in Tuscany and the Lipari Island, and from the borax deposits of California; also prepared chemically from borax.

Description.—A permanent, odorless and faintly bitterish acid occurring in three forms: in transparent, pearly, lustrous, colorless scales; in six-sided crystals; or as a bulky white powder, having a slightly grease-like feel. It dissolves easily in glycerin, hot or cold water, and hot or cold alcohol. *Dose*, 1 to 15 grains.

Preparations.—1. *Glyceritum Boroglyceri*, Glycerite of Boroglycerin. (Solution of Boroglyceride, Glycerite of Glyceryl Borate). Contains about 30 per cent of boric acid in solution in glycerin.

2. *Unguentum Acidi Borici*, Ointment of Boric Acid. Contains 10 per cent of Boric Acid.

Action.—Though used for the destruction of roaches and other insects, boric acid, even in considerable quantities, has but little effect upon the higher animals. When absorbed from local applications, or injected into the pleural cavity of man (5 per cent solution) death has resulted, preceded by vomiting, hiccough, mental depression, and collapse. Some cases exhibit a general cutaneous erythema and diarrhœa, followed by bloody vomitus and increased action of the kidneys. The overactivity of the latter finally results in complete anuria and death. (For further effects of the acid, which are similar to those of its sodium salt, see *Sodii Boras*.) The use of boric acid as a food preservative, now forbidden by Federal act, was not without occasional deleterious action, where foods preserved by it, such as milk, were continuously used.

Therapy.—*External.* Boric acid in concentrated form is decidedly irritant; but in dilute solution it proves wholly non-irritating, and even sedative. It is feebly antiseptic, therefore it should not be depended upon in serious local infections. To some extent it is antipyic. Applied by means of saturated compresses it is a useful dressing for non-septic wounds and where such a protective is needed following gynecological and other operations. A saturated solution may in this manner be applied to dog-bites, and in lesser strength to simple lacerations, and it forms one of the best of applications for cellulitis, particularly that occurring in the leg and ankles. Boric acid solution is a favorite cleansing wash for the mouth of

suckling babies and to cleanse the mother's breasts after nursing. Sunburn and other cutaneous inflammations are gratefully treated with boric acid lotions, and it sometimes bleaches freckles.

For fetid perspiration the solution is one of the best known agents and compares well with salicylic acid and potassium permanganate for bromidrosis of the feet and axillæ. A glycerole (boric acid 1., glycerin, 30) is valuable in aphthous ulceration, œzena, nasal catarrh, and pharyngitis. This glycerole, or the boroglyceride, may be diluted to a suitable degree and employed as a cleansing wash in diphtheria and other forms of sore throat, vaginitis, urethritis, and in irritative ophthalmias. The solution may be used to wash away mucoid and fetid secretions from cavities, and as a douche for leucorrhœa and colic irrigation. Great care must be used, however, in flushing the bowels and bladder with it lest poisoning result, and only the very weak solutions should be so employed and quickly removed, for the acid is rapidly absorbed.

A 5 to 10 per cent ointment forms a splendid dressing for burns and scalds, acting as an antiseptic protective and promoting healing with but little or no scarring provided it be kept *constantly* applied. Applied to ulcers and old sores it protects against infection. Ointment of boric acid is valuable in many skin affections, notably trichophytosis genito-cruralis, and to allay itching, as in urticaria.

Boric acid, in various preparations, is largely used in ophthalmic and aural practice. The solution gives relief to irritable eyes with itching and redness, and in the various forms of conjunctivitis with much secretion. Where the conjunctival surfaces are thickened and velvety and the secretions abundant and watery, the acid in impalpable powder may be dusted upon the parts, though the practice should not be long continued lest unpleasant dryness of the membrane result (Foltz). Corneal ulcer and phlyctenular conjunctivitis may be treated in the same manner. For ciliary blepharitis an ointment (5 to 10 grains to 2 drachms of petrolatum) is useful though less effective than yellow oxide of mercury. In ophthalmias a few drops of Lloyd's ergot or colorless hydrastis add greatly to the efficiency of the solutions of the acid. In purulent otorrhea a solution of 10 to 20 grains in an ounce of absolute alcohol makes an excellent cleansing application. Under no circumstances should the powdered acid be packed into the canal, as was formerly practiced, on account of damming in the secretions and thus forcing infection into the attic and mastoid cells.

Internal. Boric acid is used but little internally. Owing to its power to correct fetor, and its slight astringency, it may be given to modify fetid eructations arising from fermentative dyspepsia. By its chemical action it may be given to correct excessive alkalinity of the renal secretion resulting in ammoniacal urine and its consequent cystic irritation and inflammation. It probably renders the urine acid through its power over fermentation.

ACIDUM CITRICUM.

Citric Acid.

An organic acid usually obtained from lime-juice or from lemon juice. (Formula: $C_6 H_8 O_7 . H_2 O$).

Description.—Translucent, colorless, prismatic crystals, or a white odorless powder, with sharp, but pleasantly sour taste. It effloresces in a warm atmosphere. It dissolves freely in hot and cold water, and less readily in ether. *Dose*, 1 to 15 grains.

Specific Indications.—Elongated, reddened tongue, with prominent papillæ; scorbutus; fevers with red, long tongue; excessively red inflamed surfaces in inflammatory rheumatism, with acid urine and long, red tongue thinly coated white.

Action.—In large doses in man citric acid acts as a gastro-intestinal irritant, though no cases of death from it have been recorded. In small animals it has caused heart failure, tetanic convulsions, and death. Used moderately it retards the coagulability of the blood, but too continuously employed it may have the opposite effect. Its continued use disturbs the gastric function and may induce an acid condition of the stomach. Citric acid is most largely eliminated by the kidneys, rendering the urine acid if a large amount has been taken. Small quantities, through conversion into alkaline carbonates, render the urine less acid, and sometimes alkaline. It is an active antiseptic.

Therapy.—*External.* Solutions of citric acid have been used successfully to reduce enlarged tonsils, retract elongated uvula, and to give relief in scrotal and general pruritus. Lemon juice is a popular lotion for "tan and freckles".

Internal. Citric acid is decidedly antiscorbutic and may be used to prevent and to cure scurvy or scorbutus. For this purpose it is most generally used in the form of lemon juice, which contains it. (See Limon). Citric acid and lemon juice are absolute specifics for scurvy, being equaled only by fresh vegetables of the cruciform family and by orange-juice. The actions of lemon juice and citric acid are not, however, exactly identical, though as a rule where citric acid is needed lemon juice may be prescribed therefor. When lemons cannot be procured a powder of citric acid (1 part), sugar (10 parts), and oil of lemon (1/5 part) may be used. By adding a half drachm to a glass of water a factitious lemonade may be prepared for use in scurvy, acute rheumatism, with red tongue and acid urine, and as a refreshing, refrigerant drink for acute fevers and inflammations where acids are indicated and permissible. Under like conditions it is sometimes useful in hepatic torpor and jaundice.

ACIDUM GALLICUM.

Gallic Acid.

An organic acid usually prepared by acting upon tannic acid with sulphuric acid. (Formula: $C_7H_6O_5+H_2O$).

Description.—Permanent white or fawn-colored silky and interlaced needle crystals, or three-sided crystals; of feebly acidulous and astringent taste, and without odor. Very soluble in boiling water, alcohol, or glycerin; less soluble in cold water, or ether; chloroform scarcely dissolves it. *Dose*, 3 to 20 grains.

Specific Indications.—Passive hemorrhage, with feeble pulse and cold extremities, inelastic skin and relaxed capillaries; hematuria, with nausea, dizziness, headache, and dull aching in the region of the kidneys; soft, pasty, granular conjunctivitis.

Action.—Gallic acid does not precipitate albumin nor gelatin. Therefore it is not a good styptic. When ingested it is quickly absorbed. Much of it is probably oxidized in the body, and the balance excreted unchanged by the kidneys, over the secretions of which and of the skin it has a marked control. As a topical astringent it is much inferior to tannic acid, but as a remote astringent it is much more powerful than the latter. Upon being

absorbed it acts upon the blood vessels by contracting them and thus controls the bleeding. Tannic acid, in its passage through the system, is converted, partially at least, into gallic acid, and ultimately into sodium gallate. Therefore time is saved and more direct action obtained by primarily administering the gallic acid. Gallic acid is less valuable to control hemorrhage from the gastro-intestinal tract, and diarrhœal discharges, than tannic acid, for here the intended action is that of a local styptic and astringent. But when it is desired to control bleeding in parts that can be reached only through the blood current, gallic acid is to be preferred. Gallic acid does not constipate.

Therapy.—*External.* Trachoma, with soft, pasty granulations has been successfully treated by the insufflation of gallic acid, and the same method is sometimes used in old cases of purulent conjunctivitis. Use 1 part of gallic acid to 2 of tannic acid twice a day (Foltz). An application of gallic acid and stramonium ointment gives relief to irritable and painful hemorrhoids.

Internal. Gallic acid is probably the most certain astringent for hematuria, while for hemoptysis of passive character it is a standard remedy. It is also useful in passive uterine hemorrhages, as in the menorrhagia of chronic debility. In the latter 5 grains should be given 3 or 4 times a day during the flow, as well as during the intermenstrual period. In hemoptysis it is best exhibited with Dover's powder, 3 grains of each every hour, while at the same time ergot is given by mouth or hypodermatically (Locke). Nose-bleed may be controlled by it in doses of 2 to 5 grains every 3 hours, and the same doses have been advised in hemorrhage from the bowels in typhoid fever. It has long been used for the control of night sweats, and for chronic mucous discharges from the bladder. Some have asserted it of great value to restrain the excretion of albumen in both acute and chronic nephritis; while in polyuria (diabetes insipidus) it sometimes arrests the excessive secretion of urine by constringing the renal capillaries. Gallic acid is said to have some value in purpura, and to alleviate the distress of pyrosis. Often opium is combined with it in the latter affection. The glycerole may be given in doses of 10 to 30 minims four times a day (Webster).

ACIDUM HYDROBROMICUM DILUTUM.

Diluted Hydrobromic Acid.

An aqueous solution varying not more than one-half per cent above or below a 10 per cent hydrobromic acid (H Br.) content.

Description.—A strongly acid colorless liquid, having no odor and a sharply acid taste. It should be kept away from light, in glass-stoppered containers. *Dose*, 5 to 60 minims, preferably in sweetened water.

Specific Indications.—Dry, red tongue, headache from cerebral hyperæmia, delirium, fever, tinnitus aurium, especially from cinchonism; dull pain in the abdomen, with fretfulness and peevishness.

Action and Therapy.—Hydrobromic acid combines the action of the bromides and an acid. As it is powerfully irritant and corrosive it must be administered largely diluted. It is less apt to cause acneiform eruptions and other symptoms of bromism, but is regarded as less efficient for most purposes than the other bromides. It has not completely fulfilled the hopes of those who believed it might supplant the latter. The taste is, of course,

more agreeable than that of bromide salts. Its most valuable use is in tinnitus aurium of a pulsating and knocking character from the use of quinine and the salicylates, and the headache and fullness that frequently follow the employment of those preparations and of the salts of iron. It may be used also for nervous excitability, nervous exhaustion from too free indulgence in tea and alcoholics, in hysteria of ovarian origin, nymphomania, sleeplessness from sexual erethism, and sometimes, though rarely, to allay gastric irritability and arrest the vomiting of pregnancy in highly excitable women. It is especially serviceable in nervous headache in plethoric women with full and excited circulation and in similar conditions when arising from eye-strain (De Schweinitz). Hale recommended it in fevers with marked irritability and restlessness, the tongue being red and dry. It is also of value in cerebral excitement during fevers, and when due to physical and mental overwork. Epilepsy appears to be aggravated by it. A syrup of hydrobromic acid (Gardner's) is a pleasant form of administration, the dose being from 1/2 to 4 fluidrachms.

ACIDUM HYDROCHLORICUM.

Hydrochloric Acid; Muriatic Acid.

An aqueous fluid containing about 32 per cent of absolute hydrochloric acid (HCl). It must be preserved preferably in dark-colored, glass-stoppered bottles.

Description.—A strongly acid, colorless fuming fluid, of a pungent odor and intensely sour taste. It mixes in all proportions with water or alcohol. Both the odor and fumes disappear when hydrochloric acid is diluted with two measures of water.

Preparations.—1. *Acidum Hydrochloricum Dilutum*, Diluted Hydrochloric Acid (Diluted Muriatic Acid). Contains about 10 per cent of Hydrochloric Acid. *Dose*, 1 to 30 minims, largely diluted with water and taken through a glass tube.

2. *Specific Medicine Hydrochloric Acid Dilute. Dose*, 1 to 40 drops well diluted with water.

Specific Indications.—Deep-red, dry and contracted tongue, with a brownish coating; membranes dark-red when not due to deficient decarbonization of the blood or to cardiac embarrassment; sordes; tongue contracted, fissured and brown, or with central brownish stripe; or tongue dark or dusky-red, moderately full and slick, having the appearance of spoiled beef; pungent heat of skin, slow digestion and nervous prostration; pyrosis.

Action.—Small doses of hydrochloric acid cause gastric warmth and quicken the circulation. It tends to increase the normal secretions, allay thirst, and stimulate the digestive processes. Decided intoxicating effects may be induced by it, while its long-continued use may result in salivation. It precipitates albumens. The concentrated acid is violently irritant and corrosive, though it does not attack flesh as energetically as sulphuric acid. It is more likely to penetrate the epiderm and vesicate than to completely destroy the skin. Poisonous doses corrode the stomach, and whether fatal or not result in a violent gastro-enteritis.

A poisonous dose causes intense burning pain and discoloration of the throat, esophagus and stomach. The tongue is swollen and intensely red, with occasional whitish patches. Great restlessness, dry feverish skin, dilated pupils, sunken features, and a small wiry and irregular pulse, precede collapse and death. Vomiting of bloody matter may occur, but more frequently only retching, and whitish fumes may be evolved from the mouth just after the acid is swallowed.

The treatment should consist in the free use of diluted alkalies, oxide magnesia, or soapsuds. If possible, alkaline carbonates and emetics should be avoided, on account of their liability to rupture the already softened stomach by the effort of emesis, and the overdistention occasioned by the copious liberation of carbon dioxide. Demulcents should be freely given—mucilages, milk and eggs, and oils. Morphine should be given hypodermatically to allay pain. Recovery has taken place after large quantities of the acid have been swallowed.

Therapy.—*External.* Undiluted hydrochloric acid may be used to cauterize cancrum oris and small poisoned wounds. Diluted more or less it is a grateful application for the relief of frost-bites and chilblains. The full strength acid is useful to decalcify carious ossicles of the ear as well as the walls of the tympanum and external auditory canal, to render their removal by operation less difficult. Foltz suggested a broomstraw as an applicator. In very dilute solution it is useful as a wash for aphthæ, the deep, red, sore throat of scarlatina, and to retract a relaxed uvula.

Internal. This is a very important medicine when given according to its specific indications. There is always the deep-red mucosa, with the tendency to decay, and a marked depravation of the fluids of the body, as shown by the raw, slick, beef-like tongue, or the dark-red or dusky, dry-fissured tongue. There are also such deposits as sordes upon the lips, teeth, and tongue. All the exudates are of a dark color. Temperature may be high, yet sedatives fail to act. In all such conditions hydrochloric acid prepares the system for the kindly action of other indicated medicines. Such conditions frequently prevail in fevers from the simplest types to that of typhoid. The acid is most often indicated in acute disorders, and acts as a powerful azymotic.

Hydrochloric acid is a most important drug in certain digestive disorders—chiefly those in which the normal hydrochloric acid of the gastric juice is deficient and those in which fermentative changes play an important rôle. Laboratory studies now confirm the clinical uses instituted many years ago, when, though suspected, it was not proved that achlorhydria or hypoacidity were the causes of many digestive disturbances. These cases of deficient normal acid may exhibit nausea, vomiting, pyrosis, and stomatitis; there may be greasy-yellow or brown eructations, with an exceedingly unpleasant and bitter taste, and the breath is hot and pungent. The red and dry or slick tongue and membranes are characteristic. It may be simple indigestion or advanced dyspepsia; at all events hydrochloric acid is deficient. In typhoid fever it is useful to supply this lack and to increase the secretion of mucus and to prevent decomposition and disintegration of the blood. It aids what little digestion is possible in such depraved conditions. The softening and cleaning of the tongue under its use is proof of the good it is doing for the patient. It should be given, as a rule, with food or just afterwards; a favorite method of Scudder being to add it to beef tea. Given before meals it will sometimes check hyperacidity. It is also useful in intestinal indigestion with fermentative diarrhœa, and in severe dysentery and catarrhal diarrhœa of children, when the indications for acids are present. While it may be indicated in many diseases and conditions, it is most often needed in diphtheria, pneumonia, rheumatism,

torpor of the liver, erysipelas, purpura hemorrhagica, and in the nausea following an alcoholic debauch. We have observed grateful effects from its use in phthisis, in which it allays thirst and restlessness, and seems to stimulate digestion and assimilation and to retard septic changes. In the earlier stages of pulmonic tuberculosis it is especially valuable, often proving tonic on account of the gastric stimulation excited by it. As in cancer of the stomach the natural acid of the gastric juice is abnormally deficient, substitution of this chemical form is certainly rational. As a gastric stimulant, tonic, and digestant, hydrochloric acid is frequently combined or associated with nux vomica, hydrastis, and other essential tonics. Added to solutions of quinine it prevents many of the unpleasant effects attributed to cinchonism. The acid should be given in small doses largely diluted to obtain its best effects.

ACIDUM HYDROCYANICUM DILUTUM.

Diluted Hydrocyanic Acid; Diluted Prussic Acid.

An aqueous solution designed to contain 2 per cent of Hydrocyanic Acid (HCN). It should not vary more than one-tenth per cent above or below the 2 per cent standard.

Description.—A colorless, thin liquid, having a characteristic bitter-almond or peach-pit odor.

☞ It should be tasted or smelled only with the greatest caution, as it is one of the deadliest poisons. It is also very unstable, and old preparations may be wholly inert. It is not to be confused with Scheele's Prussic Acid, which is double or more the strength of this acid. *Dose*, 1 to 3 minims diluted with water, syrup, or mucilage. The smaller amounts should always be given as initial doses. It is an extremely uncertain and unsatisfactory preparation.

Action and Toxicology.—Hydrocyanic acid is one of the deadliest, if not the most rapid of all poisons. If a sufficient amount has been taken it poisons every part of the system—brain, nervous system, heart, and lungs and every organ concerned in maintaining the forces of life. Small doses produce in man salivation, a hot, bitter taste, irritation of the fauces, epigastric warmth, dizziness, swimming, tinnitus and pain in the head, numbness, dusky countenance, drowsiness, staggering gait, precordial constriction, and increased or decreased heart-action, with palpitation. Ulceration of the mouth, with profuse ptyalism, has followed the use of such doses.

When a lethal dose has been swallowed its action is extremely rapid. The victim may gasp and drop dead at once. In any case the symptoms are rarely delayed more than *one* or *two minutes* (Taylor). Large lethal doses commonly cause unconsciousness immediately. The eyes are fixed and glistening, and the pupils dilated and unaffected by light, the face cyanosed, there is a brief convulsion, then collapse, and death. If a lesser, but still lethal, dose is taken, there is difficult breathing, slowing of the heart, and mental depression; then follow dilated and irresponsive pupils, convulsions, rarely wild cries, flaccid limbs, cold sweating, duskiness and turgidity of the face, breathing at long intervals (appearing dead between intervals), imperceptible pulse, and involuntary ejaculation of semen and discharges of urine and feces. Lastly the stage of collapse and asphyxia comes on and death quickly takes place. Usually, in fatal cases, relaxation rather than convulsions is the rule. Occasionally rigidity with set jaws and oozing of bloody froth are observed. The eyes retain their peculiar luster

after death, and the turgescence of the gastric mucosa, as well as the engorgement of blood in the deeper veins, with empty arteries, and the purplish discoloration of the skin, are among the post-mortem appearances. The odor of the acid, if present, the deep cyanosis and the rigidity of the jaws justify a diagnosis of prussic acid poisoning. As the acid is very unstable and its odor easily dissipated, no trace of the latter can be detected unless the body be opened. The only substance resembling it is oil of mirbane. The odor of the latter persists for hours after autopsy; whereas the excessive volatility of the former causes its complete dissipation within a very short space of time. Death may result from either respiratory or cardiac paralysis. Taylor compares the death to that from lightning; the patient either dies quickly or recovers altogether. If death does not take place in one hour, the patient will probably recover.

If a very large dose has been taken, treatment is of little avail. There is seldom time to administer antidotes; and so rapid is the action of the poison that the patient is either dead or convalescent by the time a physician reaches him. But if the patient is still alive every effort should be made to keep life in the body. The theoretical antidotes are sulphate of iron (ferrous sulphate) and hydrogen dioxide, but as the poison is so rapidly absorbed little hope can be entertained from their possible chemical action. Cardiac and respiratory stimulants, strychnine and atropine should be given subcutaneously, and ammonia by mouth, by inhalation, and even intravenously. Alternate hot and cold affusions, dashing the water or pouring it from a height, on the head and spinal column, artificial respiration, and electricity are all rational procedures and should fearlessly be employed.

The symptoms, treatment, and prognosis of poisoning by Potassium Cyanide are identical with those for Hydrocyanic Acid. The poisoning, however, does not take place quite so rapidly, thus insuring a better opportunity of resuscitating and saving the patient.

Therapy.—Neither hydrocyanic acid nor potassium cyanide should be used where other agents will suffice; nor should they ever be employed except in the minutest doses. It must be remembered also that the former is prone to decomposition and is often of variable strength on account of its great volatility; in such cases it may prove to be inert, leading the physician to try larger doses, which in case of good preparations may induce collapse or death.

As a sedative it is sometimes used to allay nervous irritability, vomiting from irritation of the stomach, spasmodic cough, dyspepsia with morbid sensitiveness of the stomach, and congestive headache. It is most serviceable in spasmodic coughs and in the irritable cough of phthisis. For the latter it is usually prescribed with syrup of wild cherry. It is also recommended for cough dependent upon irritability of the stomach. So fugacious is its action, however, that it had best be dispensed with altogether. Its action in angina pectoris and cardiac palpitation is less certain and satisfactory than that of amyl nitrite or nitroglycerin; and its employment in gastralgia is scarcely justified in view of the fact that there are many safer and more certain agents for that purpose. Scudder advised a prescription of 5 minims of the 2 per cent acid in 4 fluidounces of water, the dose of

which is a teaspoonful every 2 or 4 hours, where there is an "elongated and pointed tongue with reddened tip and edges; and uneasy sensations in the stomach."

ACIDUM HYDRIODICUM DILUTUM.

Diluted Hydriodic Acid.

An aqueous solution containing 10 per cent of Hydriodic Acid (HI).

Description.—A strongly acid liquid, colorless, or not more than pale yellow. It has a sharp sour taste. It mixes in all proportions with alcohol or water. Owing to liberation of free iodine it should be kept from light and air, in a dark-colored and well-stoppered bottle. If it is dark in color it contains free iodine and should not be used. *Dose*, 1 to 15 minims.

Preparation.—*Syrupus Acidi Hydriodici*, Syrup of Hydriodic Acid. *Dose*, 5 to 60 minims.

Action and Therapy.—Syrup of hydriodic acid has practically the same action as iodine and the iodides, but is less apt to produce their distressing coryza and iodism. It has been especially recommended for the treatment of periodic hyperæsthetic rhinitis or hay fever, and as a preferred form of the iodides for the relief of gonorrheal arthritis. Foltz advised it in phlyctenula, iritis, interstitial keratitis, and purulent otitis media, all of syphilitic origin. On account of its more agreeable taste and milder action many prefer it in the various manifestations of tertiary syphilis, when the stomach will not tolerate the other iodides. It is a useful absorbent for the offending products producing pulmonary indurations following pneumonia and to remove pleuritic effusion and deposits.

ACIDUM LACTICUM.

Lactic Acid.

A liquid obtained chiefly by lactic fermentation of milk sugar or grape sugar, and composed of lactic acid and lactic anhydrides.

Description.—A colorless, or nearly colorless, deliquescent, syrup-like liquid, almost devoid of odor, and having a not unpleasantly sour taste. It mixes with water, or alcohol, or ether, but not with chloroform. *Dose*, 1 to 60 minims, well diluted.

Specific Indications.—Gastric irritation with thirst, deep-red tongue, and diarrhœa with green stools; itching of the skin, and cutaneous eruptions arising from gastro-intestinal disturbances; putrescency in the intestinal canal caused by decomposition of proteids.

Action.—Lactic acid is a normal constituent of the gastric juice, and to its excess in the system has been attributed one of the causes of the various undefined conditions classed as rheumatism. In the light of present pathology it certainly is not the cause of the acute articular variety, now definitely known to be an infectious disease. Very large doses are said to be hypnotic (Mendel), but as such it is feeble and uncertain and has had no practical application. Lactic acid softens hardened epithelium and dissolves false membranes. The lactic acid bacillus prevents proteid fermentation in the intestinal canal.

Therapy.—*External.* Lactic acid continuously applied attacks and removes epithelial excrescences, such as warts, horny growths, and tylosis of the palms and soles. It should be applied with a hair pencil. "Liver spots" (chloasma) and freckles (ephilides) are gradually bleached by a lotion of 1 part of the acid to 5 to 20 of water; or more rapidly, though certainly less desirably, made to disappear by the application of the concentrated

acid repeated until the epiderm and underlying pigment are removed in such a manner as to prevent cicatrization. The lesions are dressed with a mild zinc or similar ointment. Webster declares it second only to acetic acid in obstinate tinea versicolor. It has been applied to ulcers of the nasal fossæ and in suppurative otitis media. In the latter its good effects are not commensurate with the irritation of the auditory canal produced, and the same objection holds good as to its use in caries of the bony structures of the ear. It fails to destroy granulations of the tympanum. It has rendered aid in diphtheria and follicular tonsillitis by dissolving the membranous exudate in the one and the cheesy deposits in the other. It has no curative properties, however, in either disease. The solution (from 5 to 8 per cent) may be used as a spray or gargle, or may be painted directly upon the parts.

Internal. Lactic acid is a valuable aid to digestion, and proves useful in gastro-intestinal disorders with feeble digestive power when the indications for acids are present. In fact it acts better in some conditions than hydrochloric and other commonly used digestive acids. Within very recent years the lactic acid bacillus, in the form of tablets, or milk preparations fermented by it, has been largely used to prevent and to correct imperfect intestinal digestion due to putrefaction produced by the decomposition of proteids. It is of no value, but rather aggravates that form of intestinal perversion occasioned by the decomposition of carbohydrates. This usage has been acquired from the time-immemorial custom of the Bulgar peasants of using sour milk and that fermented in goat skins as a chief article of diet, with the reputed result of prolonging the years of life. Metchnikoff's "old age" theory was based upon the life-prolonging powers of the lactic bacillary power of such foods as soured milk. He himself, however, barely survived the allotted span of three score years and ten. It has been a well-known fact in this country, particularly in the Eastern States, that delicate stomachs that can scarcely retain any other food, kindly receive buttermilk and coagulated or "clabbered milk," and to a less degree freshly prepared "cottage cheese." There is extreme sensitiveness to ordinary foods and an evident hypoacidity of the stomach requiring this class of acid proteids. An important use for lactic acid is in infantile diarrhea attended with pain and irritation, and the frequent passage of green stools. In this condition it is a most positive help, and should be given in boiled water, and sweetened if desired, so that the little patient receives from 1/2 to 1 drop at a dose. For adults the daily range of dosage should be from 1 drop to 3 or 4 drachms, well diluted, but the best specific results come from the small doses of from 1/2 to 5 drops, well diluted and, if desired, sweetened by the addition of sugar.

At one time lactic acid was largely used in phosphaturia and oxaluria, on account of the facility with which it dissolves phosphate and oxalate of calcium, especially those forms which are natural constituents of the bones.

Lactic Acid Bacillus has been advised in rheumatoid arthritis. Without doubt its good results come from the improvement of the condition of the digestive tube, for that disorder unquestionably depends largely upon intestinal putrefaction and retained products of imperfect metabolism.

ACIDUM NITRICUM.

Nitric Acid.

An aqueous solution containing about 68 per cent of HNO_3.

Description.—A fuming caustic and corrosive acid liquid having a peculiar irrespirable odor. It should be kept in dark-amber, glass-stoppered bottles. *Dose*, 1 to 20 drops, largely diluted with water or syrup. (*The usual method of prescribing it is:* ℞ *Nitric Acid, gtt. xxx. Simple Syrup* ℥*iv. Mix. Sig. One teaspoonful every 3 hours.* It should be taken preferably through a glass tube and the mouth afterward rinsed with an alkaline fluid.)

Specific Indications.—Pale rose-red, or deep red tongue, with a violet haze, seemingly like a transparent color over red, usually with moderately red membranes (Scudder); harsh, explosive cough; imperfect waste, with foregoing indications.

Action and Toxicology.—Nitric acid fumes inhaled kill by producing congestion, hemorrhage, and œdema of the respiratory tract, with dyspnœa as the chief symptom. If death does not occur very shortly traumatic or aspiration pneumonia may supervene, with or without recovery. The fumes from batteries charged with it may act deleteriously in poorly ventilated rooms.

Like the other strong mineral acids, nitric acid precipitates albumen and is a poison to protoplasm. It is powerfully escharotic, the parts affected being stained a deep yellow. Fatal doses are immediately followed by intense, burning pain in throat and œsophagus, reaching to the stomach; gaseous eructations, abdominal swelling; violent emesis of fluids and solids, mixed with strongly acid, yellowish shreds of mucus, and dark-brown, altered blood. Great tenderness of the abdomen is felt. The oral membranes are soft and white, turning to yellow or brown. The teeth are also white or yellowish, and the dental enamel corroded. Viscid mucus fills the mouth, and swallowing or speaking is extremely difficult. The tongue is swollen and yellow, and the tonsils enlarged. Obstinate constipation ensues, and liquids increase the pain and vomiting. The pulse becomes quick, small, and irregular, the surface cold, and shivering takes place. A light stupor, from which the sufferer may easily be aroused, supervenes, and as a rule the intellect is unimpaired to the last. Should the fumes have been inhaled also, pneumonia complicates the case.

Death usually takes place in from 1 3/4 to 24 hours. The smallest quantity that has proved lethal is 2 drachms. If death does not occur the prognosis for future health must be guarded, for as with all the corrosive poisons there may result destruction of the gastric glands or gradually increasing œsophageal stricture, terminating in death from starvation many months after the ingestion of the poison.

After death the parts with which the acid came in contact exhibit shades varying from white to yellow and brown. The throat and trachea and lungs are congested and inflamed. The œsophageal membrane is yellow or brown, soft, and readily detachable in long shreds. The stomach shows the greatest damage, and though so soft as to break down under the faintest pressure, singularly no cases of perforation have yet been observed. The gastric membrane is partially inflamed, and exhibits patches of a yellow, brown, green, or black color. Such changes may be observed also in the duodenum, though only redness may be apparent.

The treatment of poisoning by nitric acid is identical to that for Sulphuric and Hydrochloric Acids (which see).

Therapy.—*External.* Concentrated nitric acid is the best and most manageable escharotic for the removal of warts and venereal vegetations; and may be used when a cauterant is thought advisable in the treatment of chancre and chancroids. It may also prove useful to cauterize poisoned wounds, bites, and stings, and to destroy unhealthy flesh in phagedenic ulcers, cancrum oris, and rarely to dissipate small hemorrhoids. The latter usage is a relic of barbarous medication, though effective; scarcely any pain is caused at first, but considerable suffering follows. It may be resorted to only in those who refuse operative relief. Nitric acid is similarly used in fistula in ano, ulceration of the os uteri, and in syphilitic ulcers of the throat and other parts. A solution of 10 to 20 drops of the acid in 1 pint of water makes a good stimulating wash for sloughing and ill-conditioned ulcers and for certain chronic skin eruptions, as porrigo and acne, and in the more acute impetigo and erythema nodosum. In treating these skin lesions it is frequently also given internally. Some have used it successfully for the removal of pterygium, a method that may well be discarded. When applying nitric acid externally a strong solution of soap or of a simple alkali or alkaline carbonate should be at hand to limit its action whenever desired.

Internal. Writing of nitric acid, Scudder (*Specific Medication*, p. 189) pointed out the specific conditions as follows: If the tongue, whether pale, rose-red, or deep-red, presents a violet haze, we have an indication for nitric acid. We will notice the same violet haze wherever the blood comes to the surface in the capillary circulation. I think we get the most decided results when the mucous membranes are moderately red. Do not mistake the deep, solid purple of the mucous membranes we see sometimes for this violet haze, for here the irritable stomach very frequently presents the red tip and edges of tongue, and sometimes elongated papillæ."

With the indications clearly in evidence a dilute sweetened solution of nitric acid makes a very agreeable cooling drink for use in fevers, particularly when there is a disposition to putrescency, or marked prostration. Occasionally this acidulous draught is useful in serous diarrhœa and dysenteric diarrhœa, especially when the hepatic function is imperfect. Though less often serviceable than hydrochloric acid, it is, when sharply indicated, useful in enfeebled and irritative gastric disorders, more particularly when dependent upon or associated with torpor of the liver or subacute hepatitis. Many have regarded it of especial value when hepatic and gastric derangements occur in syphilized constitutions. It assists greatly in the elimination of uric acid, and though less effectual than nitrohydrochloric acid, is effectual in oxaluria. Nitric acid is sometimes indicated in continued fevers, typhoid fever, typhoid dysentery, and in pneumonia with typhoid symptoms. With quinine, which it easily dissolves, it is of considerable service in chronic agues and in malarial headache. It lessens the probability of cinchonism.

Nitric acid is one of the most direct and specific of medicines in whooping cough. An agreeable form of administration is in syrup, syrup of tolu, or syrup of orange, or some such preparation as the following: ℞ Nitric Acid, gtt. x; Compound Tincture of Cardamom, ʒij; water, ʒj. Simple Syrup, q. s. ʒiv. Mix. Sig. One teaspoonful every 2 to 4 hours.

Wash the mouth well, after administering, with a dilute alkaline solution. To be effective in pertussis, nitric acid must be given according to the specific indications noted above. We have had excellent results in explosive cough, evidently due to medullary irritation, from ℞ Nitric Acid, gtt. x; Sanguinarine Nitrate, gr. j; Specific Medicine Drosera, gtt. xxx; Water q. s. ℥iv. Mix. Sig. One teaspoonful every 2 or 3 hours. Nitric acid should always be administered well diluted.

ACIDUM NITROHYDROCHLORICUM.

Nitrohydrochloric Acid; Nitromuriatic Acid; Aqua Regia (Royal Water).

A mixture of 18 parts of Nitric Acid and 82 parts of Hydrochloric Acid. To be kept in not more than half-filled, dark-amber-colored, glass-stoppered bottles, in a cool place.

Description.—A fuming, pure yellow, very corrosive acid liquid, emitting a strong odor of chlorine. Goldleaf is easily dissolved by it (hence its name Aqua Regia, on account of its superior dissolving power). *Dose*, 1 to 5 minims, largely diluted.

Preparation.—*Acidum Nitrohydrochloricum Dilutum*, Diluted Nitrohydrochloric Acid (Diluted Nitromuriatic Acid). *Dose*, 5 to 30 minims, well diluted.

Action and Therapy.—Large quantities of this acid act as a corrosive poison like its constituents, and in poisoning by it like treatment should be instituted. Even small doses attack the dental enamel and gold fillings and produce gastric derangements. When used diluted as a bath, it is absorbed, increasing the hepatic and renal secretions, and producing a sense of burning in the mouth and fauces, and induces profuse ptyalism, redness and tumefaction of the gums, and ulcers of the cheeks. Diarrhœa is occasioned by it also.

For some unexplained reason nitrohydrochloric acid acts upon the liver with greater force than other acids, and proves useful in conditions in which even its components are of little or no value. It was introduced as a remedy for hepatic affections, especially the chronic hepatitis of tropical climes, the bath being formerly preferred. Small doses of this or the diluted acid are sometimes employed in hepatic fullness and tenderness, and in dyspepsia with constipation or slight jaundice. The type of jaundice benefited by it is that occasioned by duodenal catarrh, or by torpor of the liver, it being of no practical value in that occasioned by gall-stones or other obstruction of the gall-duct. In the conditions that come within the compass of the elastic term biliousness this double acid has had a large employment; and it has been thought to be effectual in chronic congestion of the liver with a tendency toward induration or enlargement of that viscus. It is one of the agents prescribed by some for cirrhosis of the liver in its early stage, but has little to recommend it further than its salutary effect upon the gastro-hepatic function in digestion as far as the condition of the liver will allow it to participate. A fomentation (1 to 3 drachms to a pint of water) has been advised as very efficient in liver troubles, applying it to the hypochondrium. When intestinal indigestion results in chronic diarrhœa the latter is often checked by nitrohydrochloric acid. It is more likely to disorder the stomach and bowels than either of its component acids.

H. C. Wood is authority for the statement that surprising results come from use of nitrohydrochloric acid in oxaluria: "A condition probably dependent upon defective primary assimilation, in which the chief symp-

toms are general malaise, a feeling of weakness, a lack of elasticity, and a very great depression of spirits, with the crystals of calcium oxalate generally present in the urine."

What little success attends its use in chronic syphilis and sluggish cutaneous ulcers is probably due to its generally beneficial effects upon gastro-hepatic metabolism.

White Liquid Physic.—"The White Liquid Physic as given by Dr. Scudder (*Mat. Med.*, p. 185), is made as follows: ℞ Sulphate of sodium lb. ss; water Ojss; dissolve the sulphate of sodium in the water, and add nitric acid ℥j; hydrochloric acid ℥j. This differs from the original White Liquid or Dow's Physic in the omission of alum. This he regarded as one of the most efficient remedies in dysentery, used to produce at least one bilious evacuation, and afterwards continued in smaller doses. 'It acts directly upon the liver, removes the constipated state of the upper part of intestinal canal, lessens the tormina and tenesmus, and speedily checks the dysenteric discharge' (Scudder). *Dose*, a tablespoonful every hour in sweetened water until catharsis ensues. In order to protect the teeth from the action of the acid in this preparation, each dose should be sucked through a straw or glass tube; and, immediately after the dose has been swallowed, the mouth should be rinsed once or twice with an alkaline solution." (*American Dispensatory.*)

ACIDUM OXALICUM.

Oxalic Acid.—(Formula: $H_2C_2O_4 . 2H_2O$).

An organic acid existing naturally in some plants, but prepared chiefly by acting upon sugar or starch, or other organic substances, with nitric acid; or by fusing a mixture of caustic potash, caustic soda, and saw-dust, and subsequently purifying it.

Description.—Transparent, colorless and odorless, prismatic crystals of a faintly acid taste, and slightly effloresing in dry air. Readily soluble in alcohol and water.

Action and Toxicology.—Oxalic acid is a local irritant and escharotic. Internally its irritant effects are less pronounced according to dilution, but the absorbtive effect is much increased. It poisons the blood and the nervous system. The symptoms vary greatly, more so than that of most irritant poisons. Death may occur in less than five minutes or be delayed for nearly a month. If the dose be large it kills quickly, usually within an hour; and one drachm has proved fatal. The soluble oxalates (potassium and ammonium) are equally, but less rapidly, poisonous.

Lethal doses produce the following symptoms: Intensely pure acid taste, burning of the parts touched by the acid, intense pain, vomiting of bloody material, extremely feeble pulse, inability to sit or stand, mental dullness, collapse, and death. The blood becomes excessively red and the gastro-intestinal mucosa is bleached, softened, and loosened. When death is long delayed the kidneys show deposits of crystals of calcium oxalate.

In poisoning by oxalic acid (or its *soluble* oxalates) the antidote is *chalk*. If this is not at hand, magnesia should be given. Both form *insoluble* oxalates. An emetic or the stomach pump should be used immediately, and demulcent drinks freely administered. Cardiac and respiratory stimulants should be injected subcutaneously. *Alkalies should not be given*, as they form with the acid equally poisonous *soluble* oxalates.

Therapy.—*External.* King advised oxalic acid in saturated solution as a cure for acne and scald head. Great care must be exercised lest it poison by absorption. It is in use among many surgeons for disinfecting the hands preparatory to operating. Kelly declares it and permanganate of potassium to be the only practical means of perfect surgical hand preparation. Oxalic acid and the soluble oxalates remove iron stains from garments. For this reason the solutions of the acid or of binoxalate of potassium, popularly known as "salts of sorrel", or "salts of lemon", are kept on hand in households. The chief reason for including this acid in this work is the liability to poisoning by it from the preceding solutions, or when children eat too freely of sorrel (Rumex Acetosella and allied species), and sumach bobs (the fruit of Rhus glabra and Rhus typhina). A recent case of death of a clergyman has been reported from eating stewed rhubarb leaves, which at certain periods of growth contain an excess of potassium binoxalate.

Oxalic acid has attained no significant position as an internal medicine.

ACIDUM PHOSPHORICUM.

Phosphoric Acid.

An aqueous solution of between 85 and 88 per cent of Phosphoric Acid (H_3PO_4).

Description.—A colorless and odorless syrupy liquid, having a strongly sour taste. It mixes in all proportions with water or alcohol. It should be kept in glass-stoppered bottles.

Preparation.—*Acidum Phosphoricum Dilutum*, Diluted Phosphoric Acid. Contains about 10 per cent of Phosphoric Acid. *Dose*, 5 to 30 minims, largely diluted with water.

Specific Indications.—Thirst; nervous and mental derangements; atonic nervous and functional deafness with debility.

Action.—Locally concentrated phosphoric acid is an irritant and may produce redness and blistering. Internally its effects are those usual to the dilute mineral acids, but it is milder and more assimilable. In addition a mild intoxication somewhat resembling that from alcohol may be produced by half drachm to three drachm doses. Larger doses bring on a more or less persistent feeling of inertia and drowsiness.

Therapy.—Diluted Phosphoric Acid is useful to allay thirst in diabetes, and is sometimes used for the same purpose and as a refrigerant drink in fevers. In digestive weakness with eructations of sour and bitter material and pyrosis it checks fermentation and acts as a mild digestive stimulant. By some it is thought most serviceable in so-called nervous dyspepsia and in that occasioned by the debility of old age. It has been variously suggested for osteomalacia, atonic deep-seated eye disorders, tobacco and alcoholic amblyopia (with nux vomica), and keratitis in feeble individuals. Foltz is authority for the statement that it has cured disseminated choroiditis. Functional nervous deafness is reputed to have been improved by it. It has little value as a medicine, however, except as a feeble digestive stimulant and in refrigerant and thirst-allaying drinks. Its value as a nerve-tonic is much overrated and it is utterly useless for direct aid in sexual debility, a state in which it has been proclaimed a medicine of great power.

ACIDUM SALICYLICUM.

Salicylic Acid; Orthohydroxybenzoic Acid.—(Formula: $C_7H_6O_3$).

An organic acid, existing naturally in a variety of plants, but most generally prepared synthetically from phenol salts. Those varieties prepared from Oil of Wintergreen and Oil of Birch are preferred in Eclectic practice

Description.—Occurs as fine needle crystals or a crystalline powder, having no odor but a sweetish alkaline, subsequently acrid taste. Exposure to air does not change it. Very soluble in alcohol and ether; less so in boiling water, and sparingly in cold water. *Dose*, 1 to 15 grains; the smaller doses are to be preferred.

Specific Indications.—Acute infections caused by the micro-organism of rheumatism; acute articular rheumatism; "rheumatic pain with little fever; tongue broad, full, purplish or leaden colored, showing spots where the fur is detached" (Scudder). Chronic catarrh, with fetor.

Action and Toxicology.—Salicylic Acid is decidedly antiseptic. When inhaled it provokes sneezing and coughing. Applied to the skin it attacks the epithelium, and if its action be prolonged it softens the horny layer of the epiderm and allows it to separate from the corium. This is accomplished, as a rule, without provoking inflammation. Upon abraded surfaces and the mucosa it is a decided irritant, and when swallowed in concentrated form may be destructive to the esophageal and gastric surfaces; diluted, both the acid and its salts disorder digestion, probably by interfering with the functions of the digestive enzymes. The acid is readily absorbed, and circulates in the blood-current as salicylates of the alkalies. It slightly increases the urine, in which it may be detected as early as five minutes after ingestion, and is chiefly eliminated in that excretion, though it is also found in all the secretions of the body. To the urine, in which some of it is eliminated unchanged, or as salicylates, but almost wholly as salicyluric acid, it imparts an olive-green color, due to the presence of indican or pyrocatechin, or both. The urine, even when strongly alkaline, is rendered acid by its presence, and so great is its antiputrefactive power that the fluid will remain undecomposed for several days after being voided. Salicylic acid and its salts act upon the motor centers, the cerebral cortex, and some of the nerves of special sense, as the auditory nerve. In general, however, unless the dose be toxic the effect upon the nervous system is not noteworthy, nor well understood. Respiration is but little affected, except by large doses, when it is increased. In toxic quantities it may be labored, quick and deep, and when death occurs from it it is due to centric respiratory paralysis. Its action upon respiration is both centrally and peripherally exerted. The heart and circulation are, if anything, slightly depressed by even moderate doses, while large amounts are actively depressant, especially if the acid be contaminated with creosotinic acid. Salicylic acid, and notably its sodium salt, increases the secretion of bile. Temperature is unaffected in health by small doses, and slightly depressed by large amounts. In febrile states, however, a very decided reduction in temperature takes place. The elimination of urea and uric acid is greatly increased by it, as is that of the sulphur compounds. Whether the large quantity of urea and uric acid voided are those naturally formed under ordinary conditions, or whether of increased formation due to metabolic activities induced by the drug, is still a matter undetermined. The preponderance of opinion leans toward the latter theory.

Doses of salicylic acid sufficient to be objectively observed produce symptoms analagous to those of quinine—fullness and noises in the head, with buzzing and roaring in the ears (*tinnitus aurium*). Larger doses increase the head symptoms and may cause severe headache, defective sight and hearing, and profuse sweating. These phenomena are all intensified by toxic amounts, when ptosis, dilated pupils, squint, deafness, slow and labored pulse, characteristic deep and quickened breathing, and restlessness deepening into dilirium may occur, followed by collapse. Blindness and hemorrhage into the retina and uterine hemorrhage and abortion have been caused by salicylic acid. Extreme irritation of the kidneys, with congestion and albuminuria, have also been produced by it, and in some instances acetonuria has resulted. Death, though rarely, has resulted from salicylic acid.

Occasionally urticaria has been caused by salicylic acid; more rarely exanthematous, bullous, purpuric or gangrenous skin eruptions. Mental disturbances are common, and dangerously violent delirium may come on in drunkards. In others active dreams and visions, and talking in sleep have been noted. In still others delirium—variously cheerful, melancholic, or furiously maniacal, may ensue. Illusions and hallucinations are not uncommon, and a state simulating delirium tremens, but devoid of terror, has been observed in some instances of poisoning by this acid and its salts. To the syndrome caused by salicylic acid, which is analagous to the cinchonism produced by quinine, the term *salicylism* has been given.

Therapy.—*External.* Salicylic acid admixed with talcum powder or chalk may be used as a dusting powder to restrain excessive sweating, and in bromidrosis of the arm-pits and feet. The acid may also be applied full strength to gangrenous and cancerous ulcers to destroy fetor and restrain the formation of pus. A spray of it, in solution, is sometimes useful for its deodorizing quality in œzena, fetid bronchitis, chronic pharyngitis and pulmonary gangrene. At one time it was valued as a local wet dressing to wounds, to prevent pus formation, and to ulcerating wounds to restrain suppuration and correct offensive odors. It is now seldom used for these purposes, though it is very effectual for the last named office. Thiersch's solution (salicylic acid 1 part, boric acid 6 parts, water 500 parts) is a useful antiseptic solution for diphtheritic throats and other purposes.

Dissolved in collodion (about 1 to 8 or 10), it is a certain agent for many skin diseases showing hardened tissues. A preparation of well-deserved approbation, composed of salicylic acid 10 parts, extract of cannabis 4 parts, and flexible collodion 86 parts, is exceedingly effective for the removal of corns and warts. Another good form is salicylic acid 10 parts, extract of cannabis 3 parts, extract of thuja 10 parts, flexible collodion 77 parts. Mundy states that a saturated solution of the acid in collodion will promptly cure ringworm, and that a solution of it is an excellent application for rhus poisoning. A wash of salicylic acid in water makes an effectual douche for offensive leucorrhœa and a cleansing agent in fetid gonorrhœa, both in the male and the female.

The ointment (about 1 to 10) is useful in the various types of tinea, especially tinea circinata, in chronic weeping eczema, scaly and exudative palpebral eczema (gr. v to petrolatum ℥j), to remove freckles, and in lupus

erythematosus and lupus vulgaris. An ointment of salicylic acid gr. x, specific medicine veratrum ʒj, petrolatum ʒj, is an excellent stimulant and deodorant for fetid nasal catarrh and ozæna. Howe valued it in ointment to relieve pruritus and soften the hardened edges of rectal fissures. In alcoholic solution it is the best agent we have found for sweating of the feet with stench and exfoliation of whitish patches of the skin, evidently of fungous origin. The shoes should be washed with the same solution, or dusted with a salicylated powder of fuller's earth or talc, and a pair of clean stockings put on every morning after treating the feet the previous night. Salicylic acid is an excellent deodorant for excretions, but is too expensive for general purposes. Foltz used a 4 per cent glycerin solution to destroy the false membrane in diphtheritic conjunctivitis.

Internal. (Compare also *Sodii Salicylas.*) Salicylic acid and its alkaline salts, particularly sodium salicylate, are the most direct and certain antirheumatics known to medicine. They are believed to act directly upon the micro-organism of rheumatism—the *diplococcus rheumaticus*—destroying it or inhibiting its power, or upon its toxines. However they act, they are incontestably of the greatest service in acute articular rheumatism or rheumatic fever, bringing the active symptoms quickly under control and shortening the duration of the disease. If their administration be begun early, in considerable doses, they mitigate the severity of the pain, reduce the swelling of the joints, lessen the fever, and favor a restoration of the suppressed secretions of the skin and kidneys. An important result of their early use is the protection they give to the heart valves and the endocardium from the rheumatic invasion, and the subsequent train of evils that follow heart complications ordinarily following long-drawn-out cases of acute rheumatic fever. As the heart-lesions usually occur as the disease advances, the salicylates prevent their occurrence chiefly by shortening the course of the attacks, and destroying the micro-organisms, or inhibiting their activity before they migrate to that organ. It has been said that relapses are more frequent after salicylates than after any other form of treatment. In our opinion this is due to incomplete medication, many physicians beginning the treatment with fairly large doses and discontinuing them upon the abatement of the more distressing symptoms. When the drugs have been continued in regularly-given small doses after the first use of the larger amounts, and even after the pain and fever have subsided, we have observed no greater tendency to relapses or to recurrences than is ordinarily encountered in the history of this disease. The salicylates are useful in all forms of true acute rheumatism, but are far less effectual, though not without value, in subacute or muscular rheumatism, rheumatic neuritis, and in the so-called chronic rheumatism—an elastic name covering a multitude of ill-defined and misunderstood painful conditions.

Scudder, writing in the pioneer days of the salicylates, believed salicylic acid to be indicated in acute and subacute rheumatism with but little febrile reaction, the tongue being full, moist, purplish or leaden-colored, and, where the rheumatic area exhibits local redness, with slight purplish discoloration, especially when pressed upon. He preferred two grain doses of the acid every two hours. Locke believed the acid contraindicated by the pointed red tongue—an evidence, of course, of gastric and other irritability. In

view of the fact of its great general utility in acute rheumatism, however, the wisdom of limiting its use strictly to these indications may be questioned. A wide use of the sodium salt convinces us that the best indication is the genuine uncomplicated rheumatic invasion, provided the heart and kidneys are unimpaired.

In so-called rheumatoid arthritis, or rheumatic gout, the salicylates are only relatively useful. As there is here no true rheumatic invasion, but more than likely disturbing causes resulting from imperfect metabolism, little aid should be hoped for by their administration. In gouty conditions associated with or following true rheumatism, more certain results are obtained. They are best aided by the concurrent use of the acid, or its compounds, and specific medicine colchicum. Some prefer salicylate of colchicine, but in our opinion the latter is less manageable and less effective. Practically no results are obtained from the salicylates in gonorrhœal arthritis, misnamed "gonorrhœal rheumatism", which is due to the ravages of the gonococcus. When sciatica and lumbago occur in one of a rheumatic diathesis, or closely following an acute rheumatism, the salicylates are helpful They are of value also in rheumatic angina.

The salicylates are of distinct value in various infections of the tonsil resulting in acute tonsillitis. When of the quinsy type, they often do good by preventing the formation of pus, provided they are used very early. After pus begins to form, they do not retard it. But as many such invasions are known to be closely followed by a rheumatic seizure, their use is justifiable, even after suppuration and during convalescence, for undoubtedly they tend to prevent a rheumatic storm, when the damaged tonsil acts as a port of entry for the micro-organism.

Salicylic acid is of value in dyspepsia with yeasty fermentation and eructations of gas, and in gastric catarrh, with dilatation of the stomach and vomiting of material containing sarcinæ. The latter are destroyed by its antiseptic action. Given internally in small doses, it is said to cause the expulsion of lumbricoids.

For all of the rheumatic disorders, either the acid or the sodium compound may be used, although the acid is converted into salicylates in the body. We prefer the latter.

The internal use of salicylic acid in surgical fever, diphtheria and similar states is now practically abandoned. It is certainly not a desirable remedy in typhoid fevers or allied adynamic conditions. Sometimes it relieves neuralgias, particularly migraine when associated with a rheumatic diathesis; and some contend that when chorea is associated with rheumatism or occurs in a patient subject to rheumatism it is to be preferred to arsenic. While larger doses of salicylic acid (10 to 30 grains) have been advised, the better method of administration is to give from 2 to 5 grains in capsule every 3 hours until 20 grains have been taken. If no untoward effects are produced, this may be repeated each day until the desired results are obtained.

Owing to their undoubted effects as intestinal antiseptics both salicylic acid and its salts may render service in states leading to intestinal inflammation, particularly first attacks of acute catarrhal appendicitis. If they do not act quickly, and pain, rectus-rigidity and rising temperature persist or increase, they should not further be relied upon.

ACIDUM SULPHURICUM.

Sulphuric Acid; Oil of Vitriol.

A liquid containing about 94 per cent of H_2SO_4. It should be kept in glass-stoppered bottles.

Description.—A colorless and odorless, heavy, oil-like liquid, very corrosive and caustic. It strongly reddens litmus and chars organic matter. It mixes, with generation of heat, in all proportions with water or alcohol. ☞ The acid must always be very cautiously *added to* the diluting medium.

Preparations.—1. *Acidum Sulphuricum Dilutum*, Diluted Sulphuric Acid. (Strength, about 10 per cent.) *Dose*, 1 to 2 minims, largely diluted.

2. *Acidum Sulphuricum Aromaticum*, Aromatic Sulphuric Acid (Elixir of Vitriol) (Sulphuric Acid [about 20 per cent], tincture of ginger, oil of cinnamon, and alcohol). *Dose*, 5 to 30 minims, well diluted.

Specific Indications.—The deep-red tongue; diarrhœa, with deep-red tongue and gastric debility; colliquative sweating, with great debility; acute lead poisoning.

Action and Toxicology.—The protracted use of diluted sulphuric acid is exceedingly deleterious in its effects on digestion, and may give rise to diarrhœa, with consequent weakness and loss of flesh. It is at all times and in all conditions destructive to the teeth. It slows the pulse, increases the appetite, allays thirst, and checks excessive cutaneous excretion. Injected into the venous circulation, the strong acid coagulates and chars the blood. The pure acid destroys flesh, redissolves coagula, and penetrates deeply, carbonizing the tissues wherever it touches.

If swallowed in any amount, death is almost sure to follow, as the tissues over which it passes are utterly destroyed. The symptoms are intense burning pain, escape of gaseous or frothy material, retching and vomiting of shreds of tissue and dark, coffee-ground and bloody fluid, and excoriation of the parts over which the acid passes, giving them a whitish appearance, as of parchment that has been soaked. This whitish hue subsequently changes to gray or brownish, and the mouth is filled with a thick, sticky mixture of mucus, saliva, and corroded tissue. Breathing, speaking and swallowing are very difficult, and the face assumes a livid or bluish appearance. If breathing be not obstructed, from injury to the larynx, the face is pale and the expression extremely anxious and indicative of intense suffering. Pain is increased upon the ingestion of fluids, and upon movement of the abdominal muscles. Exhaustion, great weakness, small, feeble, quick pulse, cold, mottled skin, bathed in clammy sweat, great thirst, obstinate constipation and convulsive movements, are also symptomatic. The intellect remains unimpaired until death.

If death is not immediately produced, it may subsequently result from œsophageal stricture, or gastric inflammation and ulceration; in either case causing death by starvation. After death, the parts are found corroded, and colored whitish, gray or brown-black, with ecchymoses. The stomach may be perforated, but if not, it is collapsed and its tissues contracted, the stain being black or brown over the entire surface, or merely in black streaks, according to the amount of food in the organ. The contents are of the same hue, and tarry in consistence. If perforation occurs, other neighboring organs may be attacked. Death from poisoning by this acid usually occurs in from 18 to 24 hours. The smallest dose which has killed is 1, 2 drachm. Again, death may result months or years afterward from the

effects of the poison. Sulphuric acid should be antidoted with calcined magnesia, if at hand; if not, other alkaline solutions may be given. Emetics and alkaline carbonates should, if possible, be avoided, and the stomach-pump should not be used on account of the friability of the corroded tissues. Mucilaginous drinks, milk, oils, albumen and soaps may be given after the antidotes if the acid swallowed be small in amount, or in a diluted form. Chalk, lime water, white-wash or plaster from the walls may be used if nothing else can be obtained. Morphine may be given to quiet pain, and heat should be applied to the body.

Therapy.—*External.* Sulphuric acid is used, though rarely, as a cauterant for warts, chancre, syphilitic and slow healing ulcers; sometimes by applying it as a paste combined with charcoal, or zinc sulphate. On account of its affinity for the water of the tissues it is less manageable, and not so desirable as nitric acid for this purpose. When so used the surrounding tissues should be protected by oil or petrolatum. It has been employed to destroy small malignant growths and to touch poisoned wounds and the bites of animals; and in extropion and ectropion to cicatrize the palpebral tissue in such a manner as to reverse the direction of growth. A dilution may be employed to stimulate healing in indolent, venereal and phagedenic ulcers; and very much diluted it makes an agreeable astringent wash for ulceration of the mouth and throat, relaxed uvula, profuse salivation, certain sluggish and weeping skin diseases, and small hemorrhagic surfaces. All of these uses, which are often effective, are more or less archaic.

Internal. Dilute sulphuric acid is a good tonic. It sharpens the appetite, promotes digestion, quenches thirst, and inhibits fermentation of the contents of the stomach. Therefore it is useful in hyperacidity, with pyrosis, digestive debility and gastric fermentation and relaxation. As a refrigerant and antiseptic it may be used in continued fevers as a pleasant drink, and as a tonic during convalescence from exhausting diseases. It is grateful in erysipelas, in the hectic fevers of suppuration and phthisis, and assists in controlling colliquative sweating, the aromatic sulphuric acid being one of the best agents for this purpose. As an antiseptic it frequently does good service in fevers arising from putrefaction of food or the body tissues. In the form of sulphuric acid lemonade (containing about 5 to 10 drops of the aromatic acid to four ounces of water), it is valuable to prevent and to treat acute lead poisoning. An insoluble lead sulphate is formed which is less easily absorbed than lead. Workmen employed in the making of white lead and paints, and type setters often take this preparation as a prophylactic. For acute lead colic and lead constipation a solution of magnesium sulphate or sodium sulphate in very dilute sulphuric acid is the most effective remedy; for chronic lead poisoning and its results, as wrist drop and lead neuritis, iodide of potassium is the remedy best known.

Asiatic cholera appears to have been as well controlled by sulphuric acid as by any other form of treatment; besides it would seem possibly to be prophylactic. Serous diarrhœa, or painless colliquative diarrhœa, with light colored, watery and alkaline stools is promptly restrained by the aromatic acid. Neither should it be overlooked in small passive hemorrhages from the stomach and bowels.

Aside from its purely astringent action when so desired, the acid should be given preferably when acids are specifically indicated—by the deep redness of tongue and mucous membranes. Both dilute sulphuric acid and the aromatic preparation should be taken through a glass tube in order to protect the teeth, employing thereafter an alkaline wash.

ACIDUM SULPHUROSUM.

Sulphurous Acid.

A liquid composed of not less than 6.4 per cent of sulphurous acid gas (SO_2).

Description.—A colorless liquid, having the characteristic odor of burning sulphur, and a very sour sulphurous taste. *Dose*, 5 to 60 minims, well diluted.

Preparation.—*Specific Medicine Acid Sulphurous. Dose*, 5 to 60 drops, well diluted.

Specific Indications.—Full relaxed, dirty-looking tissues, with deep redness and sticky, unhealthy discharges; sweetish, mawkish odor of breath and excretions; increased and viscid saliva; full, broad, atonic tongue, normally red, with a glutinous coat, either transparent or dirty-brownish, with effaced papillæ; gastric derangements with yeasty fermentation. All the conditions are those of sepsis and debility. *Locally:* parasitic skin diseases.

Action.—Sulphur dioxide or sulphurous acid gas has long been a popular disinfectant. Where plenty of moisture is present it is effective, but as ordinarily passed off as a dry gas it is of questionable efficiency. Used properly it would decolorize and otherwise damage household articles; but in empty rooms which have been occupied by the sick and which are to be repapered or painted it may be used with an abundance of steam being generated in the room, to accomplish satisfactory disinfection.

Pronounced irritation of the glottis is caused by inhaling sulphur dioxide, and the sensation of suffocation is intense. Large amounts violently inflame the air passages. Fatal cases from the burning of coal giving off a large quantity of this gas show a cold surface, livid countenance, purple lips, hands and nails; short, quick breathing; small, feeble and quiet pulse; fixed pupils and complete insensibility—in short all the symptoms of asphyxia. Congestion of the brain, heart, and lungs is, as a rule, the chief post-mortem feature, like that in one who has been hanged (Taylor).

Sulphurous acid (and its salts) attacks organic matter energetically, having a selective affinity for oxygen. Fungi, bacteria, and other low forms of life are destroyed by it. It has especial value in its power to destroy the low organisms of putrefaction and fermentation.

Therapy.—*External.*—Sulphurous acid is an active parasiticide. After scabs have been removed and the parts thoroughly cleansed it may be applied full strength, or diluted with glycerin or water or both, to the desired strength. It is better to combine some water, or rose water, with the glycerin, as the latter in full strength irritates the skin and does injury by its avidity for the moisture of the tissues, leaving them hard, dry and liable to crack. Tinea tonsurans, tinea favosa, and tinea versicolor, and other forms of trichophytoses, as ringworm, are diseases in which it is active and efficient. It destroys lice and the itch insect, and is effectual in the mange of animals. It is a good application for chilblains, chapped hands, urticaria, erysipelas (with glycerin), and purpura. Sloughing wounds and

ulcers, with sticky, glutinous secretion, and mucous patches and mercurial stomatitis have been successfully treated by it. It is especially prompt in removing pathologic exudates from the throat, tonsils, and fauces. In the form of a wash or spray it has been employed with asserted success in thrush, diphtheria (with dusky color of membranes), follicular pharyngitis and tonsillitis, chronic laryngeal irritation, with consequent weakness of voice or complete aphonia, and in chronic bronchitis, with abundant expectoration. As a decalcifying agent for the removal of fragments of carious bone from the aural canal and tympanum it is less efficient than hydrochloric acid. In all but the local and parasitic skin diseases it should be given internally conjointly with its external application.

Internal. Sulphurous acid is strongly azymotic and as such was introduced into medicine for its influence upon bacterial life. The sulphites of sodium or magnesium produce similar results, as they become decomposed when in the stomach, and give out sulphurous acid. It has little effect upon spores. When specifically employed it is one of the most satisfactory of medicines, but the preparation must always be fresh and should not be left long in contact with water. Therefore, the fresh acid should be dispensed in bulk, with directions for its dilution. When the acid is old or has been kept badly corked it changes to sulphuric acid, on account of its avidity for oxygen.

Sulphurous acid cases call for acid medication; though it is not used as an acid, for its acid properties are feeble. Still the general state of the system tends toward excessive alkalinity (redness), while, on the contrary, the alkaline sulphites are indicated in excessive acidity (pallid tongue and membranes). The characteristic condition for sulphurous acid is one of a low state, with normal or increased redness of the tongue and membranes. The tissues are enfeebled, full and relaxed, and appear to have lost vitality; the pulse large and empty, the sensation under the finger being that of a large-calibered vessel, with a small stream of blood. The secretions are nasty, dirty, and exhale, as well as the breath, a peculiar, sweetish, mawkish odor. The membranes are reddened and dirty, or muddy in color. The tongue is characteristic, being coated, over red, with a glutinous, nasty, yellowish-brown, or the coating may be transparent; and, again, it may appear as if fecal matter had been rubbed upon it. In later stages a moist, glutinous, brownish fur may line the center of the organ. Occasionally the tongue is slick and shining, like a piece of raw beef. Dirty-looking sordes soil the teeth and lips; and the saliva is increased in quantity, viscid, and mawkish. When indicated by external appearances, as in erysipelas and like conditions, the tissues are deep-red, and appear to have lost vitality. The erysipelatous redness blanches more or less as the disease progresses, "sometimes in the center, sometimes at the border, sometimes in the deep structures, you seem to be looking through the superficial redness" (Scudder, *Specific Diagnosis*, 90). Wounds and abrasions seem to show a tendency to slough, and are bathed in dirty, sticky, unhealthy secretions. Add to these a depraved state with yeasty vomiting, and you have the specific uses for one of our most important antiseptics.

Used in the conditions named, it will be found a most useful agent in scarlet fever, enteric and remittent fevers, in surgical and puerperal fevers,

measles and small-pox, often striking at the basic causes and always of assistance to other indicated remedies. In bronchitis and pneumonia it may be given freely when the expectoration is fetid and mucopurulent, the cases inactive, and the type of fever not high but prostrating. It has no effect in tuberculosis other than to modify the odor and quantity of viscid and fetid expectoration. In that form of tonsillitis, with stinking, cheesy plugs, or a more diffuse and offensive membranous deposit, it should be used both locally and internally. For diphtheria it is one of the most certain agents to hasten dissolution of the exudate, and should be freely used locally as a wash or painted upon the membrane; at the same time it should be given internally. An aromatized syrup or glycerin may be used as a vehicle. Ellingwood advises a good form of administration prepared as follows: ℞ Dilute sulphurous acid ʒiij, Sulphur ʒj, Syrup of Tolu (or Mucilage of Acacia) ʒij. Mix. Sig. One half to one teaspoonful every half hour, without taking water afterward. In this way both its local and internal influence is obtained. While it is a valuable medicine in diphtheria, it must not be depended upon alone to cure the disease, though it may check the progress of mild types. Still every case of diphtheria should be presumed to be malignant and treated accordingly.

Yeasty fermentation is checked by sulphurous acid. Therefore it frequently renders good service in fermentative dyspepsia, in sarcinæ ventriculi, and in indigestion with pyrosis and acid eructations. It is thus prompt in checking the excessive secretion, stopping vomiting, and alleviating gastrodynia. When intestinal indigestion appears to depend upon yeasty fermentation and is accompanied by sour, frothy and fetid diarrhœa with flatulence, this agent is useful to destroy the disturbing intestinal flora and restore normal functional activity.

ACIDUM TANNICUM.

Tannic Acid; Tannin; Gallotannic Acid; Digallic Acid.
An organic acid most generally obtained from nutgalls.

Description.—Cohering glistening scales or spongy masses of a non-crystalline, yellowish-white or pale brown powder, becoming gradually darker upon exposure to light and air. It has a strongly astringent taste and a distinctive but faint odor. Very soluble in water and alcohol; freely in diluted alcohol; sparingly in dehydrated alcohol, and scarcely at all in chloroform or ether. Readily soluble when heated in an equal part of glycerin. *Dose*, 1 to 15 grains.

Preparations.—1. *Glyceritum Acidi Tannici*, Glycerite of Tannic Acid (Glycerite of Tannin). Contains 20 per cent tannic acid. *Dose*, 5 to 60 drops.
2. *Unguentum Acidi Tannici*, Ointment of Tannic Acid. (Contains 20 per cent of tannic acid.)

Action.—Vegetable astringents depend upon tannins for their chief quality. The tannins, in the various types of tannic acid, differing chemically and somewhat physically, all possess the power of precipitating albumen and gelatin. Upon fresh blood they act as coagulants. Their varying intensity of action, when in their natural colloidal state, depends upon their facility and promptness in precipitating the proteids, other constituents in their natural drug combinations affecting their relative solubility. Tannic acid (gallo-tannic acid) is known to be changed in the stomach, and if its effects as a drug are to be sought in the gastro-intestinal tract, the slowly tannin-yielding astringents are to be preferred to the acid

itself. The slower disintegration of the natural chemical union allows the tannin in such forms to reach the intestines without all being transformed into gallates in the stomach. In such cases geranium, kino, rhatany, and other common astringents are to be preferred to free tannic acid.

Tannic acid is powerfully astringent and hemostatic. It precipitates albumen and coagulates fresh blood, and in this way exerts its styptic effects. To the taste it is bitter and harsh, giving a constringing sense of roughness to the mucosa of the mouth and fauces. It shrinks the tissues by acting upon the epithelial cells and glandular structures, thus restraining their secretions. It also precipitates the proteids of the latter, depositing a slimy protective layer of albumen tannate. The blood clots formed by it are hard and difficult of removal, not only appearing at the point of oozing but forming plugs extending into the lumen of the severed blood vessels. Moreover, it probably acts also upon the vascular coats. As a rule tannic acid does not derange the stomach. It does, however, temporarily interfere with digestion by uniting with and precipitating the proteids present. These, however, are redissolved as the digestive process proceeds, and the resulting peptones then refuse to unite with the tannin in the presence of the gastric acid. It has generally been held that tannic acid is converted into and enters the blood as gallic acid. The probability is that most of it undergoes oxidation in the tissues, while the balance is converted into sodium gallate. A small proportion of the unchanged acid appears to pass out by way of the bowels, but the major portion seems to be converted into sodium gallate, and as such a small quantity is eliminated in the urine and the feces.

Tannic acid sometimes, and especially when long given, occasions gastric and intestinal pain, febrile phenomena, with thirst and eructations of gas, while the tongue is coated, and defecation is tenesmic; or there may be general gastro-intestinal irritation and diarrhœa if a large dose has been taken. Rarely erythema, dyspnœa and a cyanotic condition have been produced by it.

Therapy.—*External.* Tannic acid is a sure and prompt styptic for bleeding from small incised or lacerated wounds, or abrasions. It forms a firm and antiseptic clot, effectually excluding the air. On account of the difficulty of its removal it should not be used, when it can be avoided, in small cavities. Moreover, it can only be relied upon when the bleeding is small in amount. The powder, the glycerole or the styptic collodion may be employed as best suits the purpose. The powder, the glycerole and the solution, and in some instances the collodion, may be applied in excoriations, burns, aphthous and other ulcers of the mouth, severe salivation, spongy or bleeding gums, phagedenic and other ulcers, relaxed uvula, prolapsus ani, piles, anal fissures, rectal ulcers, chilblains, and frost-bites, fungous granulations of ingrown nails, and small nasal polypi. It is of little value to destroy aural polypi, and when used in suppurative otitis media, as is sometimes advised, it is objectionable on account of the difficultly removable hardened mass that it forms.

The solution of tannic acid is valuable to restrain mucous discharges and to overcome irritation and congestion. For this purpose it may be used in varying strengths (1 to 60) for relaxed sore throats, sluggish pharyngitis,

subacute nasal catarrh, and as a constringing injection, after the previous use of plain or borax water, in vaginal leucorrhœa, cystitis, subacute gonorrhœa, and gleet.

The glycerole (or an ointment) applied on tampons and left in situ for several hours is extremely effective in erosions and ulcerations of the cervix and abrasions of the vaginal canal, and in diminishing the consequent leucorrheal discharge. It is sometimes used in pencil to be inserted into the cervical canal. The glycerole is one of the best agents to prevent and to cure cracked or sore nipples, and is a most grateful application to sores on the gums from pressure or erosion by false teeth.

Ointments of tannic acid alone, or of stramonium and tannic acid, or of nutgalls (1) and opium (15), are favorite and ofttimes effective applications to relieve and cure painful hemorrhoids.

In various forms tannic acid, the wash or ointment being preferred, is used upon moist skin eruptions to alleviate irritation and itching and to restrain the secretions. In this manner it is especially serviceable in moist herpes, intertrigo, weeping eczema, and dermatitis venenata.

Tannic acid is used somewhat in ophthalmology to repress granulation and restrain discharges. Among the conditions in which it has been advised are the following: Ophthalmia neonatorum when not healing readily and a granular condition prevails, after the preliminary treatment with a mild silver salt. The latter should be thoroughly washed from the eye before the tannic solution (1 to 20) is applied. In the early stage of trachoma with beginning granulation and injected and cloudy upper part of the cornea, the glycerole (grs. v. to ℥j) in 2-drop doses will allay the gritty sensation. In advanced trachoma, with soft, pasty granulations, it may be used in connection with gallic or boric acids: (1) Boric acid ℥iij, Tannic acid ℥j; or (2) Gallic acid ℥j, Tannic acid ℥iij. A solution (2 to 10 grains to 1 ounce of distilled water) may be employed in purulent conjunctivitis, with but little swelling, small secretion, and tendency to soft granulations.

Internal. Tannic acid was formerly in great favor with Eclectic practitioners in gastro-intestinal disorders, with unduly acid, watery or mucoid secretions, accompanied with flatulence. It was also popular in non-irritative, non-inflammatory, and non-febrile diarrhœa. It is useful to control both the diarrhœa and excessive sweating of phthisis when fever is practically absent. During the stage of collapse in Asiatic cholera, tannic acid may be given freely and frequently in full doses to control the diarrhœa. By means of a spray it is valued by some in bronchial catarrh and chronic laryngitis. In the same manner it was and is still employed to check passive hemorrhage from the lungs—when the quantity of blood passed is small. It is also effective in hematemesis, acting by direct contact of the acid with the stomach walls. It is not, however, adapted to active nor copious hemorrhages. Notwithstanding the changes it undergoes in the system, it is still believed to be useful in passive uterine hemorrhages, such as menorrhagia, with pain and nervousness. Locke advised from 3 to 5 grains each of tannic acid and Dover's powder, every hour or two, until bleeding ceased, and stated that it would check the flow provided no organic lesion were present.

Tannic acid is an imperfect chemical antidote in poisoning by alkaloids, some metallic salts, and that of poisonous fungi. The acid merely retards the absorption by a fugacious chemical union with the poison. As the tannate so formed is quickly redissolved, it must be immediately got out of the stomach.

ACIDUM TARTARICUM.

Tartaric Acid.

An organic acid usually derived from the lees of wine-making, or Argol.

Description.—Translucent, colorless crystals, or a fine or a white granular powder, without odor and having a pleasantly acid taste. Very soluble in water or alcohol. Chloroform scarcely dissolves it, and ether but slightly. *Dose*, 5 to 30 grains in water or syrup.

Action and Toxicology.—In large doses tartaric acid is a gastro-intestinal irritant and corrosive poison, producing violent burning, vomiting and inflammation of the stomach and bowels, and causing death. Three drachms, half ounce and ounce respectively, have caused death, the fatal effect usually occurring several days after taking the acid. Poisoning by it is to be treated with alkalies—magnesia, sodium bicarbonate, soap, etc., and the after symptoms, as acute gastro-enteritis.

Therapy.—Tartaric acid is a constituent of Seidlitz powders. It is antiseptic, refrigerant and antiscorbutic. Of use chiefly in scurvy, and in an artificial lemonade in fevers and inflammations admitting of the use of an acid. When desiring an effervescent drink, bicarbonate of sodium may be added to the sweetened diluted acid, made aromatic with essence of lemon or orange.

ACONITUM.

The dried tuberous root of *Aconitum Napellus*, Linne (Nat. Ord. Ranunculaceæ). Mountains of Europe and Asia, and northwestern North America. *Dose* (maximum), 1 gr.

Common Names: Aconite, Monkshood, Wolfsbane.

Principal Constituents.—*Aconitine* ($C_{34}H_{47}O_{11}N$) one of the most poisonous of known alkaloids, occurring as permanent colorless or white crystals, without odor. A drop of solution of one part of aconitine in 100,000 of water will produce the characteristic tingling and benumbing sensation of aconite. The alkaloid itself must never be tasted, and the solution only when extremely diluted, and then with the greatest of caution. Aconitine is soluble in alcohol, ether, and benzene; very slightly in water. Other constituents of Aconite are *aconine* and *benzaconine*, both alkaloids; the former of little activity; the latter a strong heart depressant.

Commercial Aconitine is a more or less impure mixture of aconite alkaloids.

Preparations.—1. *Specific Medicine Aconite.* An exceedingly poisonous and representative preparation. *Dose*, 1/30 to 1/2 drop. (*Usual form of administration*: ℞ Specific Medicine Aconite gtt. j to x: Water fl ʒiv. Mix. Sig. One teaspoonful every one-half (1/2) to two (2) hours.)

2. *Tinctura Aconiti*, Tincture of Aconite (10 per cent aconite). *Dose*, 1 to 8 minims.

☞ Fleming's Tincture of Aconite is many times stronger than the preceding, with which it should not be confounded. It should have no place in modern therapeutics.

Specific Indications.—The *small and frequent pulse*, whether corded or compressible, with either elevated or depressed temperature and not due to sepsis, is the most direct indication. Irritation of mucous membranes with vascular excitation and determination of blood; hyperæmia; chilly sensations; skin hot and dry, with small, frequent pulse. Early stage of fevers with or without restlessness. When septic processes prevail it is only relatively indicated.

Action.—The effects of aconite, considered from the so-called physiological action, are expressed in local and general irritation followed by tingling, numbness, and peripheral sensory paralysis, primarily reduced force

and frequency of the heart action, due to vagal stimulation, and subsequent rapid pulse, due to vagal depression. The heart muscle is also thought to be paralyzed by it. The action upon the vaso-motor system is not well understood, though the lowered arterial pressure is explained by some as due to depression of the vaso-motor center. In small doses aconite quiets hurried breathing, but large doses may cause death through respiratory paralysis. Temperature is lowered by aconite, probably by increase of heat-dissipation and possibly through the action of the thermo-genetic system. This action is most pronounced during fevers. Except of the skin and kidneys, the glands of the body seem to be but little, if at all, affected by aconite. The kidney function is slightly increased, while that of the skin is markedly influenced according to the quantity administered. The motor nervous system is not noticeably affected except when poisonous doses are given, but the sensory nerves, especially at the periphery, are notably impressed by even so-called therapeutic doses. It is quite clear that aconite does not act strongly upon the cerebrum, except that poisonous doses somewhat depress the perceptive faculty. Upon the skin and mucous surfaces it acts first as an irritant, then as an anæsthetic. The mode of elimination of aconite is not yet well determined, but it is thought that it is largely oxidized, thus accounting for the short duration of its action. Indeed, the systemic effects of aconite seldom last over three hours, though the therapeutic result may be permanent. When aconite kills it does so usually by paralyzing the heart, arresting that organ in diastole.

Locally, aconite and its alkaloid, aconitine, act as irritants, producing a tingling, pricking sensation and numbness, followed by peripheral sensory impairment, resulting in anæsthesia of the part. The latter is due to paralysis of the sensory nerve terminals. Usually no redness nor inflammation follows, but in rarely susceptible cases vesicular or pustular eruptions take place, or intense cutaneous itching. Both are extremely irritating to the nasal and ocular membranes, and when inhaled may give rise to a peculiar local sense of icy-coldness.

Administered internally in small doses aconite occasions a tingling or prickling sensation, felt first in the mouth, tongue, and fauces, and quickly extending to the stomach. This is rapidly followed by more or less numbness. Gastric warmth and a general glow of the surface follow non-lethal doses. Slight perspiration may be induced, but sweating to any great degree does not take place except from large doses. Then it is an almost constant symptom. Temperature is reduced, but the more readily during pyrexia, when the pulse is frequent and small, if the dose administered be fractional.

In maximum doses (by some called full therapeutic doses) aconite causes gastric heat. A sense of warmth throughout the system follows, and occasionally the thrilling or tingling sensation will be more generally experienced, with perhaps some numbness. There may be dizziness most marked upon assuming the upright posture, pain in the head, acute body pain, excessive depression, with feeble circulation and diminished respiration. The pulse may fall to 30 or 40 beats per minute and muscular weakness become extreme. Eclectic teaching has long protested against giving aconite in doses sufficient to produce these effects, which some, with extreme boldness, declare to be therapeutic results.

Toxicology.—In poisonous amounts the symptoms given are exaggerated and the effects extremely rapid. Tingling and numbness increase and are felt all over the body, the thrilling and creeping coldness approaching from the extremities to the body. Excessive sweating comes on, rapidly lowering the body temperature, dimness of vision, loss of hearing and touch, and general peripheral paralysis extending from the extremities to the trunk. The victim is conscious of danger, feels cold and is extremely anxious and prostrated. Muscular weakness is pronounced, tremors occur, and rarely convulsions. The power of standing is lost early. The face is extremely pale, the sclerotics pearly, eyes sunken, the countenance one of extreme anxiety, and there is a tendency to fainting. There may be gastric pain and vomiting. If the recumbent position is not maintained, or even if slight exertion be attempted, sudden death may occur from syncope. Unless consciousness be lost through syncope, the intellect remains unimpaired until just before death, showing that aconite probably does not greatly impress the cerebrum.

The *one* diagnostic symptom of aconite poisoning is the characteristic aconite *tingling*. If confession (in case of attempted suicide) is not forthcoming or the patient is unable to reveal the fact that poison has been taken, this of course cannot be known. In the absence of this knowledge, and when absolute muscular and other prostration, fainting and other forms of collapse, shallow dyspnœic breathing, merely trickling or barely perceptible pulse, with no vomiting, no purging, or no alteration of pupils, nor characteristic symptoms of other poisons, poisoning by aconite should be suspected. The action of a lethal dose of aconite is rapid, symptoms coming on within a few minutes. Death may occur in from one half hour to six hours, the average time being a little over three hours.

The treatment of poisoning by aconite should be prompt and quietly administered. The victim must at all hazards be kept in the recumbent position, with the feet slightly elevated. If seen early, tannic acid or strong infusion of common store tea (to occlude the poison) should be administered. External heat should be applied and artificial respiration resorted to as soon as respiratory embarrassment takes place. In the earlier stage emetics may be tried, but will probably fail to act if the stomach has been anæsthetized by the poison. The stomach-pump, or siphon, is to be preferred. Besides, emetics may be inadvisable for fear of the muscular contraction producing heart-failure. Whatever method be followed the stomach contents should be received upon a towel, the patient under no circumstances to be raised from the prostrate position. The chief hope lies in stimulation. Ammonia or alcohol, or Hoffman's anodyne, may be given by mouth, and ether, alcohol, and digitalis hypodermatically. Digitalis is the nearest to a physiological antidote to aconite, but acts very slowly, whereas the action of aconite is rapid. The more diffusible stimulants, therefore, are to be given first, and closely followed by the digitalis. Atropine may stimulate respiration, and caffeine (or hot coffee) sustain the heart. Nitrite of amyl may be used cautiously, allowing but a whiff or two, lest the stimulant action be passed and dangerous depression induced. A full dose of strychnine sulphate or nitrate (1/20 to 1/10 grain) should be given subcutaneously to sustain the heart-action. Of the newer biologic products, possibly

adrenalin chloride (1 to 1000) or pituitrin, hypodermatically administered, might aid in preventing circulatory collapse.

Therapy.—*External.*—As a topical agent, aconite, in tincture or as an ingredient of anodyne liniments, may be applied to relieve pain, allay itching and reduce inflammation. Its use, however, must be guarded as it is readily absorbed. A well-diluted spray gives relief in the early stage of tonsillitis and when quinsy occurs, and it relieves the distress and shortens the duration of faucitis, pharyngitis, and some cases of laryngitis. If used in local inflammations it should be in the earlier stages. Locally applied above the orbits it may give relief in sinusitis; used over the mastoid bone it mitigates the pain of otitis media and modifies external inflammation of the ear. Its obtunding power gives temporary relief in facial and other forms of neuralgia (when hyperæmia is present), the neuralgia preceding zoster, pleurodynia, myalgia, rheumatic gout (rheumatoid arthritis), peridental inflammation, and so-called chronic rheumatism. It also allays the pain and itching of chilblains, and the discomfort of papular eczema, pruritus ani, and other forms of pruritus.

Internal.—Aconite is a most useful internal medicine. The weight of evidence from those who use aconite most frequently shows that it is a safe agent when used in the minute dose and according to specific indications, and is proportionately dangerous as the dose approaches that which produces its physiological action. It is capable of great good in the hands of the cautious and careful therapeutist, and is capable of great harm if carelessly or thoughtlessly employed.

Aconite is the remedy where there is a dilatation from want of tone in the capillary vessels. It moderates the force and frequency of the heart's action, increasing its power, and is, therefore, useful in functional asthenia; it also lessens pain and nervous irritation. Aconite cases are those showing a frequent but free circulation; where there is super-active capillary movement; and in enfeeblement of the circulation, functional in character and not due to structural degeneration or sepsis, and manifested by a frequent small pulse, a hard and wiry pulse, a frequent, open and easily compressed pulse, a rebounding pulse, or an irregular pulse. It lessens determination of blood (hyperæmia), quiets irritation, checks the rapid circulation in the capillaries when it is too active, and increases the circulation when it is sluggish. We account for this by believing that it gives the right innervation to the vascular system. Scudder (*Diseases of Children*, 42) says of it: "I have been in the habit of saying that aconite is a stimulant to the heart, arteries, and capillaries, because whilst it lessens the frequency, it increases the power of the apparatus engaged in the circulation." It should be stated that our term sedative differs in fact from that accepted by other schools. An agent such as aconite, which in full doses would depress but in minute doses will stimulate the vascular system to normal activity and thereby reduce febrile states by correcting or regulating innervation, is classed in Eclectic therapy as a "special," vascular," or "arterial sedative."

Aconite is a remedy for irritation of the mucous membranes. It matters little whether it be of the nares preceding an attack of coryza, of the larynx, of the bronchi, or of the gastro-intestinal tube, liable to lead to inflammation of those tracts, aconite may be used to control the morbid

process. In simple gastric irritation with or without vomiting, in the irritative forms of diarrhœa—whether simple or of the more complicated forms of enteric inflammation, of cholera infantum, or of dysentery—it is equally important and usually specifically indicated. In the diarrhœa of dentition it often controls the nervous symptoms and the discharges. Of course one must take into consideration the rôle played by food toxæmia. In such cases modification or complete change of food must be resorted to, and frequently a simple purge given to cleanse the gastro-intestinal tract. Then if irritation persists, or there is fever, aconite usually acts promptly. The form of cholera infantum best treated by it is that showing increased bodily heat. If dentition is accompanied by irritation and fever, it may be given alone or with matricaria. In many of the stomach and bowel disorders, particularly gastric irritation with diarrhœa, and gastro-enteritis, it acts well with ipecac, or rhus. For aphthous ulcerations with fever, aconite and phytolacca internally with infusion of coptis locally have not been excelled. In simple dysentery, aconite, ipecac and magnesium sulphate is a most effective combination, seldom failing to control the disease in a few hours.

Aconite allays fever and inflammation, and is the most commonly used agent for such conditions. When specifically selected it proves useful in glandular fever (with phytolacca) and in acute gastritis and gastric fever, with yellow-coated tongue and diarrhœa. In simple febricula it is diagnostic. If, as Locke has well stated, the patient is not well or markedly improved in twelve hours, he has more than a case of simple fever. In intermittent or malarial fevers it prepares the way for the successful exhibition of antiperiodics. As quinine, the best antagonist of the malarial parasite, acts most kindly when the skin is moist, the tongue soft and clean, and nervous system calm, aconite is signally useful as it establishes those very conditions. In septic fevers, or those depending upon sepsis, the presence of pus, etc., its value is limited, though it may assist other measures. It is especially of value in the fevers of irritation of childhood—such as arise from overloading the stomach, from colds, and from dentition. Most febricula subside quickly, but they do so more quickly and kindly when assisted by the small dose of aconite. So valuable has aconite become in fevers, that by some writers it has been christened the "vegetable lancet;" by Webster, the "pulsatilla of the febrile state;" and by Scudder, the "child's sedative."

In all febrile states in which aconite is indicated there is *sudden onset and rapid evolution;* moreover, the remedy is seldom needed, nor indeed is it admissible except in the first few days of the invasion. Very rarely is it to be used in the protracted fevers, except at the very outset, and then it must be strongly indicated. It is much better to omit it than to advise its employment in continued fevers of an adynamic type, lest some carelessly or perhaps boldly push it in too large doses or for too long a period to the detriment of the patient. In typhoid or enteric fever there are usually conditions to face which make aconite an ill-advised medicine, except in rare instances in which distinct indications for it may be present. These are so rare, however, as to be pronounced exceptions. The blood disintegration, the toxic impression of the secretions and the nervous system,

the defective excretion and the progressive weakening of the heart and circulation, make aconite all but contraindicated in this devitalizing disease. If used at all we question the expediency of employing aconite or any other febrifuge for a prolonged period in typhoid or other adynamic fevers.

In urethral fever, due to catheterization, and in the febrile stage of acute gonorrhœal urethritis, its action is prompt and effective. It may be used as an auxiliary agent in visceral inflammations of the abdominal and pelvic cavities, when simple in character. In such grave disorders as puerperal fever, because of its highly septic character, it is of questionable utility. The same is true of peritonitis of septic origin.

In the acute infectious diseases (including the infectious fevers already mentioned, but respecting the limitations in typhoid states) aconite is of very great value when used at the onset of the invasion. It is among the best agents in acute tonsillitis and quinsy before pus forms, in the initial stage of la grippe, in acute colds, acute coryza, lobar, and broncho-pneumonia, pleurisy, and allied infections. Here it controls temperature, retards hyperæmia, establishes secretion, prevents effusion when threatened, and gives the nervous system rest. When it alleviates pain it does so chiefly by allaying inflammation. In pleurisy, aconite associated with bryonia is an admirable remedy until effusion takes place, then it no longer is serviceable. To reduce high temperature it is temporarily useful in phthisis when invasion of new portions of the lungs takes place. Aconite may be used in cerebro-spinal meningitis until effusion takes place; after which it should be discarded.

Other disorders of the respiratory tract are benefited by its action as far as irritation, hyperæmia, and inflammation prevail—acute nasal and faucial catarrh, acute pharyngitis, acute bronchitis, acute laryngitis and acute tracheitis. For spasmodic and mucous croup it is the best single remedy, often checking the disease in an hour's time. Aconite was at one time freely used in diphtheria, and is still valued by some, but its use should be carefully guarded for the same reasons stated under typhoid fever. The most it can do is to aid in controlling temperature; and if carelessly employed it may invite paralysis of the heart in a disease itself prone to paralysis through its own toxicity. Aconite should not be omitted in the treatment of erysipelas with high temperature.

Aconite and belladonna are indispensable in the exanthemata, and are the drugs most often indicated. It is to be used when the skin is hot, dry, and burning and the temperature high. By its timely use the eruption is facilitated, the temperature lowered, the secretory organs protected, spasms averted, and damage to the kidneys and the over-wrought nervous system forestalled. It is, therefore, indicated in the initial stages of varicella, measles, scarlatina, and sometimes in variola.

While by no means an antirheumatic, aconite is of marked benefit in acute inflammatory rheumatism, when high fever and great restlessness prevail. Besides it protects the heart by lessening the probability of endocarditis and possible heart failure. The dose, however, must be small lest we induce the very calamity we aim to avoid. Locke regarded it almost a specific in uncomplicated rheumatism; but while it greatly aids in reducing fever, inflammation and pain, it needs the assistance of the more

direct antirheumatics and their allies, as sodium salicylate, bryonia and macrotys. More slowly, but less certainly, it sometimes alleviates simple acute neuritis.

Mumps is well treated by aconite, asclepias and phytolacca, while for mastitis aconite, bryonia, and phytolacca are our most effective agents. With careful nursing, emptying of the breasts, and sometimes judicious strapping and supporting of the glands the formation of pus may be averted. Should it form, the bistoury is the only rational medium of relief.

As a remedy for the disorders of the female reproductive organs, aconite is very valuable. It is particularly valuable in recent amenorrhea, due to cold, if the circulation and temperature are increased; and in menorrhagia, with excited circulation and hot, dry skin. Dover's powder or the diaphoretic powder adds to its efficiency. Some rely on it to relieve the nausea and vomiting of pregnancy.

Neuralgic pain is somewhat relieved by aconite, used both locally and internally. The varieties best treated are facial, dental, visceral, and rectal neuralgia, and that preceding herpes zoster. Though most efficient when fever accompanies, it is held to be useful also when the temperature is not exalted. King found aconite a remedy of marked worth in that anomalous condition best described as non-febrile spinal irritation.

Purely functional palpitation of the heart, due to indigestion, has been relieved by small doses of aconite. One of the instances in which *large* or physiological doses of aconite are permissible is in simple cardiac hypertrophy, but even then veratrum is to be preferred. In very *minute* doses aconite has been advised by Scudder in the algid stage of Asiatic cholera, and in the cold stage of fevers.

ACTÆA.

The rhizome and rootlets of *Actæa alba*, Bigelow (Nat. Ord. Ranunculaceæ). A perennial of the United States east of the Mississippi, abounding in the rich mold of rocky forests and hillsides. *Dose*, 1 to 20 grains.

Common Names: White Cohosh, White Baneberry, White Beads.

Principal Constituents.—A non-acrid and non-bitter resin similar to that obtained from black cohosh (cimicifuga). Albumen, starch, sugar, and gum are present, but neither tannic nor gallic acids.

Preparation.—*Specific Medicine Actæa. Dose*, 1 to 20 drops. (*Usual form of administration:* ℞. Specific Medicine Actæa, gtt. xx. Water, ℥iv. Mix. Sig. One teaspoonful every 1 to 3 hours.)

Specific Indications.—Atony dependent upon nervous derangements from reproductive disturbances, with headache, insomnia, melancholia, and convulsive tendencies; extreme sensitiveness of the ovarian region; "pinkish hue of parts freely supplied by blood" (Scudder).

Action and Therapy.—Actæa is an active drug, acting in general somewhat like cimicifuga. In large doses it is emeto-cathartic, and serious gastro-intestinal irritation and inflammation have resulted from overdoses of it. It deserves a more extended study than has yet been given it. Actæa acts specifically in disorders of the female reproductive organs, with atony and nervous impairment—such as the debility conducing to amenorrhœa, dysmenorrhœa and menorrhagia, and the irritability of weakness of the sexual system provoking choreic, hysteric, and hystero-epileptic attacks.

It is only of value to correct the nervous impairment and sexual disturbances when they are underlying causes of these spasmodic disorders, and has little or no value in controlling the attacks. It has a well-sustained reputation as a remedy for after-pains; and may be used in ovarian disorders when there is pain or uneasy sensations in or around the ovaries, with extreme sensitiveness to touch or pressure. It also relieves mental aberrations arising from derangement of the reproductive organs. Like cimicifuga it is useful in atonic indigestion of the nervous dyspepsia type.

ADEPS.

The prepared internal fat of the abdomen of *Sus scrofa* var. *domesticus*, Gray (the common Hog—Fam. Suidæ), purified by washing, melting, and straining. Lard should be kept in a cool place, in well closed vessels.

Common Names: Lard, Prepared Lard, Hog's Lard.

Description: A greasy, soft, white solid, having scarcely any odor, and a bland, fatty taste; soluble in ether or chloroform, sparingly in alcohol, and not dissolved by water. It should not be rancid.

Principal Constituents.—Lard is composed of the glycerides of oleic acid (*olein*), stearic acid (*stearin*) and palmitic acid (*palmitin*).

Preparations.—1. *Adeps Benzoinatus*. Benzoinated Lard. Lard preserved by heating it with benzoin to prevent rancidity. For use in warm weather 5 per cent of the lard, or more, may be replaced with white wax. A largely used ointment base.

2. *Ceratum*, Cerate, Simple Cerate. (Composed of White Wax and Benzoinated Lard.)

Action and Therapy.—*External.* Lard is emollient and is used as a medium for massage of the skin when the sebaceous secretions are impaired. It is sometimes applied to excoriations, but causes considerable pain; it is better to apply to parts to cause them to shed excretions and thus prevent intertrigo, though it is rapidly absorbed and the surface soon becomes dry. Unless pure it may cause unpleasant sores. Lard allays itching and may be used to relieve burning and soften the scales and prevent their distribution in scarlatina and other eruptive diseases. It softens crusts of skin diseases of the scalp and facilitates their removal by washing. As a lubricant for manual examinations and obstetric operations it is preferable to petrolatum, as it does not so readily mix with the secretions. Its chief use is as a base for ointments and to prevent poultices from drying and adhering to the skin.

Internal. Melted lard is sometimes used in suffocative croup, and being difficult of digestion is somewhat laxative. It may form a part of stomachic medication in poisoning, to retard the absorption of the poison (except those poisons soluble in fats), to form soaps with the caustic alkalies, and to act as a demulcent to the resultant inflammation of the mucosa.

ADEPS LANÆ.

Wool-Fat; Anhydrous Lanolin.

The purified and water-freed fat of the wool of the domestic sheep, *Ovis aries*, Linné—(Fam. Bovidæ).

Description.—A tenacious, pale-yellow, ointment-like mass, almost odorless, and freely dissolved by ether or chloroform; very little soluble in hot or cold alcohol, and not soluble in, but capable of being mixed into a homogeneous mass with two parts of water.

Preparation.—*Adeps Lanæ Hydrosus*, Hydrous Wool Fat (Lanolin), Purified Wool Fat, containing between 25 and 30 per cent of water.

Action and Therapy.—*External.* Hydrous wool fat (or lanolin) is emollient and soothing, though it does not leave the skin as soft as some other

lubricants. It is very readily absorbed, and being miscible freely with water and glycerin it is preferred as an ointment base where such liquids or their solutions are desired to be used in such a form. Its penetrability makes it valuable for the incorporation of drugs for inunctions, massage, or to relieve local pain, as in neuralgia. It may be used to allay the pruritus of the exanthemata, to protect and soften chapped hands and lips, to soothe acute eczema, erythema, frost-bites, dermatitis, impetigo contagiosa, and to soften the skin in scleroderma and ichthyosis, to remove dry dandruff, and in old age when the skin becomes atrophied and dry. It is largely employed as a medium for the application of medicaments in scaly and infiltrated conditions in chronic diseases of the skin.

ADONIS.

The whole plant of *Adonis vernalis*, Linné. (Nat. Ord. Ranunculaceæ). Southern Europe, Siberia, and Labrador. *Dose*, 1/2 to 3 grains.

Common Name: Pheasant's Eye.

Principal Constituent.—*Adonidin*, probably a mixture of acids and glucosides.

Preparation.—*Specific Medicine Adonis. Dose*, 1/2 to 3 drops.

Specific Indications.—Weak cardiac action, with low blood pressure, and shortened diastole, with consequent venous stasis, with increased back-pressure, and feeble intermittent or irregular pulse; cardiac dropsy, with weak heart.

Action.—Fresh adonis is irritant and vesicant. Upon the circulation it acts much like digitalis, but is prompter in action and not cumulative. It is an energetic agent and capable of poisoning. Adonis slows, regulates, and strengthens the heart's contractions, raises blood pressure, and thereby acts as a diuretic. It also causes deeper and slower breathing, and in proper cases overcomes dyspnœa. Large doses paralyze the heart and blood vessels.

Therapy.—On account of its quicker action Adonis has been preferred by some to digitalis and strophanthus in the same class of heart affections to which these are applicable, or in which for some reason it is undesirable to employ them. It is especially commended where arryrthmia with feeble cardiac force and dyspnœa and dropsy are present. It has long been a popular remedy in Russia for dropsies of both heart and kidney origin. It is probably less valuable than digitalis where the cardiac valves are greatly affected. Scudder valued adonis in heart-strain from overexertion; Hale recommended it in endocarditis and in weak and irregular heart action resulting from chronic nephritis. Wilcox used it in chronic albuminuria, with pale urine and delirium with good results and in uremic convulsions, which had been frequent, without a return of the eclampsia for two years, when the patient died. It is undoubtedly emmenagogue and has been advised in epilepsy, administering it with bromide of potassium. It should not be given when there is gastro-intestinal irritation or inflammation.

ÆSCULUS.

The bark and fruit of *Æsculus glabra*, Willdenow (Nat. Ord. Sapindaceæ). A small fetid tree common to the central portion of the United States.

Common Names: Ohio Buckeye, Smooth Buckeye, Fetid Buckeye.

Principal Constituents.—The glucoside *æsculin* ($C_{15}H_{16}O_9$) (displays a blue fluorescence in water and more strongly in the presence of alkalies); æsculetin ($C_9H_6O_4$); a peculiar tannin and saponin. Starch is abundant and a rich yellow oil is present.

Preparation.—*Specific Medicine Æsculus.* (Made from the ripe fruit.) *Dose*, 1 to 15 minims. The smaller doses are to be preferred.

Specific Indications.—Sense of constriction, tightness, or uneasiness in the rectum, with or without hemorrhoids; intestinal irritation with constriction and colicky pain near the umbilicus; dyspnœa and constriction of the respiratory tract with spasmodic cough.

Action.—The dried, powdered fruit of the buckeye causes violent sneezing. Buckeye acts powerfully upon the nervous and circulatory systems. Its action is probably strongest on the spinal nerves, and in some respects resembles that of strychnine. The cerebrum is also impressed by it. Toxic symptoms include dizziness, fixation of the eye, impaired vision, vomiting, wry-neck, opisthotonos, stupor, and tympanites. In lethal doses these symptoms are increased, coma comes on, and the victim dies. Cattle are often killed by eating buckeyes; if not fatal, a condition known as "blind staggers" is produced.

Therapy.—Æsculus is sedative, somewhat narcotic, and has a special control over the portal circulation, relieving venous congestion. When the circulation is rapid and the constrictive sensation prominent and dyspnœa prolonged, it relieves such conditions as continuous asthmatic breathing. There is a sense of constriction back of the upper portion of the sternum, with or without irritative cough, that is relieved by it. It is useful in intestinal irritability with the contractive colic-like pain centering in the umbilical region, probably dependent most largely upon hepatic or portal congestion and associated with chronic constipation. Its chief value, however, lies in its power to relieve hemorrhoids due to faulty hemorrhoidal circulation. The sense of fullness and tightness rather than marked pain is the indication for it. It often succeeds admirably, and as often completely fails to relieve. Its action upon visceral disorders is practically the same as that mentioned under *Hippocastanum* (which see).

Æsculus sometimes relieves uterine congestion with full tumid and enlarged cervix and too frequent and profuse menstruation. This would suggest its possible value in uterine subinvolution. It has a domestic reputation for the cure of rheumatism, but this has not been verified to any great degree in professional practice. It has been suggested as a spinal stimulant in paralysis. If so used it should be used like strychnine after active symptoms have ceased, and to stimulate the unimpaired nervous tissue. Æsculus deserves further study to determine its status as a remedy for nervous disorders, and especially its control over visceral neuralgias.

ÆTHER.

A liquid composed chiefly of ethyl oxide $[(C_2H_5)_2O]$.

Description.—A mobile, colorless and transparent liquid, having a characteristic ethereal odor, and a burning, sweetish taste. Somewhat soluble in water, but mixes with fixed or volatile oils, and alcohol or chloroform. It should be kept in a cool situation, away from light and from fire, in partly filled, sealed containers. A fresh can should always be opened for producing anæsthesia. *Dose*, 5 to 60 minims on ice (by mouth); half the full dose, hypodermatically.

Preparation.—*Spiritus Ætheris*, Spirit of Ether, Hoffmann's Drops. *Dose*, 30 to 60 minims.

Specific Indications.—Pain, or convulsive action, with feeble circulation, and cool, pallid face; headache, with enfeebled circulation. To produce anæsthesia, for the performance of surgical, gynecological and obstetrical operations.

Action and Toxicology.—Ether has a profound depressive action upon the central nervous system and a primary stimulating effect upon the circulation. Upon the former the sequence of its effects is precisely the same as that of chloroform, impressing first the sensory areas of the cerebrum, then successively the sensory and motor tracts of the cord, and finally the sensory and motor cells of the medulla, all in the order named. To affect the nerve trunks it must be directly applied to them. Upon the circulation, when administered in ordinary amounts, it is one of the most rapid and most fleeting of stimulants, acting upon the vascular functions in an almost opposite manner to that of chloroform. It raises blood pressure by direct action upon the heart and by increasing vaso-motor activity; chloroform depresses vaso-motor control. Only in very large doses is ether a cardiac and circulatory depressant. Ether first stimulates and subsequently depresses the respiratory center. When death occurs under its use breathing is usually arrested before the heart pulsations cease. Temperature is very greatly lowered by ether. In the blood it increases the proportion of leucocytes, and slightly the number of red cells, but with a decidedly impoverished hæmoglobin value. Ether is eliminated chiefly by the lungs and to a large extent by the kidneys, having a profound irritant action upon the latter.

Locally applied, ether produces rubefaction, and sometimes vesication if its evaporation be prevented; but it acts as a refrigerant, occasioning a great degree of cold, when suffered to evaporate. Ether taken by mouth has at first a sweetish taste, followed by great heat and pungency. In moderate doses it acts powerfully on the mouth, throat, and stomach, allays spasm, and relieves flatulence, without increasing arterial action. After the burning in the stomach has subsided, a cooling sensation, quickly diffusing itself throughout the system, is experienced. It first excites the cerebral functions, then depresses. In somewhat larger doses it causes intoxication. The heart's action is increased, the face becomes flushed, the surface warm, and in a very short time sweating takes place, similar to, yet less transient than, that from alcohol, and quickly followed by a sense of contentment and mental quietude, associated with a desire to sleep. Seldom does its effect last more than one hour, even when two fluid drachms have been swallowed. Individuals may become so accustomed to taking ether that large quantities may be consumed in a day. Intoxication from ether drinking is reported common in Ireland (*British Medical Journal*, 1890). Life has not been directly destroyed by ether as a *fluid*, but several deaths have resulted from inhalation of the *vapor*. In very large doses it causes nausea, increased flow of saliva, giddiness, and suspension of sensation and voluntary motion.

The phenomena produced by the inhalation of ether are mainly as follows: When first inhaled, some faucial irritation is produced, as well as cough and shortness of breath. The extremities prickle; exhilaration, with talkativeness, or laughing, crying, praying, or raging, with a sense of lightness, is felt, and gradually all the senses are blunted or perverted, that of pain being lost before that of touch. Gradually consciousness is lost, and gradual muscular relaxation, sometimes preceded by tetanic rigidity, takes place. The circulation and respiration are quickened,

though the latter is somewhat shallower than when normal; warmth of skin with perspiration ensues, as well as contraction of the pupil. Continuing the inhalation, complete insensibility and muscular relaxation take place, the breathing becomes slow, deep, and even stertorous, the pulse slow and feeble, the pupil dilated, the cutaneous surface moist, cool, and livid or cyanotic. Stertorous breathing is the signal that respiratory paralysis is approaching. Death from ether is due to respiratory paralysis; rarely from paralysis of the heart. (For a more detailed account of the order of anæsthesia, see page 160.)

Therapy.—*External.* When applied locally, as a refrigerant, allowing it to evaporate, ether is useful in nervous and other headaches, in external inflammations, strangulated hernia, etc. As a rubefacient, it may be employed where this effect is indicated, by checking its evaporation. The spray of ether, directed upon painful parts, has been used as a local anæsthetic, as well as for minor operations, especially the opening of abscesses and for paracentesis. It has been largely supplanted by ethyl chloride for such purposes. Sprayed upon the lumbar region, it eases the pains of labor; and uterine contraction, with the control of hemorrhage, may be accomplished by spraying it on the lower part of the abdomen. Applied by vapor, or upon a pledget of cotton, it relieves earache, and combined with camphor and inserted into carious dental cavities, it controls toothache. Pediculi pubis are destroyed by it, and it is fatal to ascarides when used by rectal enema.

Internal. Ether is narcotic, stimulant, antispasmodic, refrigerant, and carminative. Its antispasmodic and stimulating properties render it efficient in spasmodic asthma, flatulent colic, hiccough, subsultus tendinum, cramp of the stomach, nervous headache, sick headache attended with double vision, nausea or vomiting, lowness of spirits, gastrodynia, hysteria, dyspnœa, and cardiac palpitation. It is also useful to overcome the painful spasms occasioned by urinary or biliary calculi, during their passage through the ducts or tubes; for this purpose it is often given with oil of turpentine. As an antispasmodic, it is useful in all forms of spasmodic action, unattended by inflammation, as chorea, epilepsy, tetanus, etc.

Ether has been subcutaneously injected in sciatica, lumbago, and other neuralgias, in sudden syncope, and in the prostration following pulmonary and post-partum hemorrhages, convulsions, and in chloral and opium poisoning, etc. The quantity injected should be from 10 to 15 minims, and care should be had not to inject deeper than the fascial tissues. When a quick diffusible stimulant is needed, ether is the most useful drug. Though its action is fleeting, it diffuses rapidly and tides over emergencies until less fugacious medicines can be made to act.

On account of its emulsifying properties when combined with fatty matter, as codliver oil, ether has been used to aid digestion and tissue production, in phthisis. By stimulating the gastric and duodenal tracts, it secondarily influences the pancreatic secretions, which then readily act upon the emulsified oil, making its digestion more perfect, and thereby adding to the nutrition of the body.

Ether should be administered in ice cold water or capsule. It is too irritating to the fauces to be given in any other way.

Ether alone or with camphor is one of the best rapid stimulants to administer in shock and poisoning and the stage of collapse in low fevers and in Asiatic cholera.

Inhalation.—Ether was the first agent to be used, as a general anæsthetic by inhalation, for the performance of great surgical operations. Under partial anæsthesia, Dr. John C. Warren, at the request of a Boston dentist, Dr. W. T. G. Morton, performed a severe surgical operation at the Massachusetts General Hospital, October 15, 1846. On the succeeding day, Prof. Hayward operated upon a patient under full anæsthesia. Dr. C. T. Jackson, of Boston, at once informed Dr. Warren that he had first imparted to Morton a knowledge of its value in the painless extraction of teeth, which was the use Dr. Morton had made of it. Dr. Crawford Williamson Long, of Georgia, probably first used sulphuric ether as a general anæsthetic, but failed to publish his use of it before others had recorded their employment of it. Ether, in America, is the most widely employed drug to anæsthetize patients about to undergo surgical operations, no matter how severe, and either it or chloroform is now universally employed for this purpose. Being adapted to the whole range of operations, it is unnecessary to enumerate them here. Not only is it used to produce anæsthesia and analgesia, but to overcome spasm and muscular resistance. For the latter purpose, it is of great value as an aid in reducing luxations and fractures and herniæ. To mitigate the pangs of labor it is useful, but chloroform is preferable, as its vapor is not inflammable, and it may be used near lights, but avoiding close contact with the open flame. Besides the majority of the conditions for which it is internally given (see page 159), it may be inhaled for the relief of dysmenorrhea, hydrophobia, puerperal and other convulsions, whooping-cough, laryngismus stridulus, spasmodic croup, mania, delirium tremens, etc. In puerperal eclampsia, it should be used to control convulsive action until appropriate remedies may be given. In the hysteria following childbirth, it is an excellent antispasmodic, as well as in infantile convulsions not depending "upon a morbid irritability of the nervous system with organic change" (Locke). Distressing after-pains are safely and quickly overcome by a few whiffs of ether, and the same procedure relieves nervous headache. Lead colic is relieved, both by the rectal enema of ether and by its inhalation.

Anæsthesia.—The induction of surgical anæsthesia by both ether and chloroform passes through three stages: (1) lessened consciousness; (2) excitement; (3) complete insensibility or anæsthesia.

First Stage. Usually, and especially under ether there is a momentary feeling of suffocation, and a sense of warmth beginning in the face and head and extending over the body. The senses gradually lose their activity, sound and voices appear distant, and the patient perceives objects mentally or actually, as through a mist or veil. Objects may run the changes of color and there is some pulsation or throbbing felt in the head. Fancied noises, as of rushing of wind or water, or ringing, hissing, roaring, or pounding in the ears, are experienced. A feeling of stiffness and inability to move the limbs follows, and the stage of approaching unconsciousness is at hand.

During this preliminary action the pulse is more or less quickened (probably partly due to the anxiety of the patient), the face flushed, the pupils dilated, and the respiration somewhat accelerated, or it may be irregular during the suffocative stage, when sometimes the breath may be held, and later be followed by a deep gasp. Coughing frequently occurs with ether. If this becomes severe and the breathing is very irregular and choking, great care should be exercised and the anæsthetic withdrawn or more air admitted. It is in this stage that many fatal accidents have occurred. Under no circumstances should any surgical work be performed at this stage, even though there is usually at this time some blunting of sensation. This stage is no bar, however, to the use of the anæsthetic to mitigate the pangs of labor. Usually this period, except the suffocation first experienced, is one of pleasurable sensations to the patient.

Second Stage. The second stage, that of excitement, varies greatly according to the subject; ranging from a mere tremor, or rigidity of the extremities, with irregular breathing, to violent muscular and mental efforts. The patient attempts to rise or push away the mask and attendants, and violent muscular contractions occur in every part of the body. His struggles may be so strenuous as to require the combined efforts of several assistants to control them. This is more especially the case with ether: though not absent in some cases with chloroform. Singing, shouting, raging, praying, crying, laughing, or cursing may be indulged in at this stage, the pleasanter disorganized thoughts and incoherent expressions usually taking place under chloroform, and the vulgar and even obscene utterances under ether. The latter especially may excite the patient to become amorous, pugnacious, lascivious, extremely vulgar, and reveal long kept secrets; and these phenomena frequently occur in those whose lives are above reproach and who when normal are models of deportment, morality, and manners. On the other hand, fear of death, abuse of physicians and attendants, and serious irreligious thoughts previous to anæsthetization may shape the unconscious behavior of the patient, whose performance is most likely due to some dream-producing state of the temporarily ungeared mind. During this stage the pulse is accelerated, the face reddened and suffused and often cyanotic, respiration more or less irregular according to the amount of struggling indulged in by the patient, and the pupil still more or less dilated. This is the time to carefully continue the administration of the anæsthetic, removing the mask from time to time, while the greatest violence and irregular breathing are manifested. Muscular relaxation now takes place, and the third stage—anæsthesia—is reached. It must be borne in mind that during this stage, when respiration has been violent and insufficient, and is then followed by a deep gasp and full inspiration a larger quantity of anæsthetic is suddenly inspired and there is grave danger of overdosing. By removing the mask entirely, or withdrawing it to a greater distance, usually this danger will be obviated.

Third Stage. This stage is marked by complete unconsciousness, with relaxation of the muscles and contraction of the pupils, which do not respond to light. Should dilation of pupils take place after contraction it is a signal of grave danger. The corneal reflex is now abolished and the conjunctiva may be touched without flinching on part of the patient,

or closure of the eyelids. The appearance of the face is that of a death-like calm, pale under chloroform, but suffusedly dark red or cyanotic under ether. The breathing, though regular, is slow and of little depth, but must be carefully watched. Indeed, at all times the state of respiration is the surest guide to safety or danger, though the pulse and the pupil should never be disregarded. Stertorous breathing is always a danger signal necessitating the withdrawal or change in manner of administration. It heralds approaching respiratory paralysis, and may be due to overdosing or to the falling of the relaxed tongue back upon the epiglottis. When short of stertor, breathing is calm and the cornea is insensitive and muscular relaxation not too profound, the proper stage for surgical operation has been reached. This stage having been attained, anæsthesia may be prolonged by the repeated and intermittent inhalation of very small quantities of the chosen anæsthetic, but it must not be forgotten that the pulse and respiration may gradually become weaker and that body heat is invariably being dissipated at this time, hence the necessity for a warm operating room, and sometimes warmth about the body and extremities. During any stage of anæsthesia it should not be forgotten that danger is imminent at any moment and that eternal vigilance is the price of life. When the patient is returning to consciousness, the pupils gradually dilate, the reflexes become established, muscular power is regained, and a stage of excitement returns and may last for minutes or hours. Very frequently vomiting is severe, and water especially should not be given the patient until this action is past. Vomiting is more likely to occur and to be more persistent under chloroform than ether. During the progress of the second and third stages an enormous quantity of saliva and bronchial mucus may impede respiration, and the harshness and succussion in breathing may be mistaken for stertor. On the other hand this should not give the administrator a false sense of security, and he should distinguish between this obstruction to breathing and the paralytic stertor. Wiping the mouth clear of these obstructions will generally enable him to differentiate them, though the dry, snoring character of stertor can hardly be mistaken. After ether anæsthesia in the child or the old, the excess of bronchial mucus is so abundant, says Hare, that there "is danger of the patient drowning in his own secretion." Atropine in full dose, before or during this stage, may obviate this danger. After the stage of post-anæsthetic excitement, the patient usually remains in a state of somnolence, or even more perfect and calm slumber which may last for several hours, and upon awakening there is usually no remembrance of what has taken place during anæsthesia. Sometimes the opposite condition prevails—wakefulness, with persistent dizziness, nausea, and vomiting.

Choice of Anæsthetic.—(1) Chloroform is more agreeable but far more dangerous than ether, and when a choice is possible the latter should be employed.

(2) Next in order of value, for brief operations, is nitrous oxide gas (see *Nitrogenii Monoxidum*), the safest of all general anæsthetics.

(3) Chloroform is generally preferred to ether in obstetrical manipulations.

(4) When general anæsthesia must be produced and there is no other available method of painlessly performing operations:

Chloroform *should be used* (1) in obstetrics; (2) in hot climates; (3) where a large number are to be anæsthetized, as in wrecks or battle; (4) when acute bronchitis or bronchial catarrh exists in children or adults; (5) in nephritis (regarded by some as more dangerous than ether) and serious kidney insufficiency; (6) in aneurism; (7) when the vessels are atheromatous; (8) in arteriosclerosis; and (9) rarely and cautiously in valvular diseases of the heart in the absence of cardiac degenerations.

Chloroform *should not be used* (1) in fatty heart; (2) in dilated heart; (3) in lymphatic subjects with lymphoid growths; (4) in adenoids; (5) in diabetes and diabetic coma; (6) in acetonuria.

Ether *should be used* (1) by preference where there are no contraindications to general anæsthesia and for long operations; and (2) in valvular disease of the heart.

Ether *should not be used* in (1) nephritis and renal insufficiency; (2) in uræmia; (3) in pulmonary œdema; (4) in pneumonia and bronchitis; (5) in atheroma of the vessels; (6) in arteriosclerosis; (7) in aneurism; (8) in apoplexy; and (9) in brain tumors or abscess (in the last four on account of increase of blood pressure).

Neither chloroform nor ether should be used in (1) fatty and other degenerations of the heart; (2) diabetes or diabetic coma; (3) advanced phthisis; (4) anemia and chlorosis with proportion of hæmoglobin below 50 per cent; (5) œdema of the glottis; and (6) in old topers with a weak heart-muscle; (7) usually in epilepsy and chorea; and (8) in feeble and obstructed heart, though they have been given where only valvular lesions exist, without change in the heart-muscle, or cardiac ganglia, with apparent safety.

Warnshuis (*Principles of Surgical Nursing*) quotes Bevan as having "most admirably summed up the present-day attitude of surgeons in the determination of the choice of anæsthetics as follows:

"*a*. Drop ether should to-day be chosen as the standard general anæsthetic when a prolonged anæsthetic is desired with relaxation and unconsciousness.

"*b*. Intrapharyngeal ether should be chosen in mouth and jaw cases when it is desirable to remove the anæsthetist and anæsthetic apparatus from the operative field.

"*c*. Gas should be chosen in short anæsthesias in which unconsciousness is desired, and in special cases, such as kidney insufficiency.

"*d*. Local infiltration anæsthesia should be chosen when the surgeon has the full co-operation of the patient and the field of operation can be completely anæsthetized."

Administration.—Preparedness and eternal vigilance are the watchwords for anæsthetization. The following instructions should be observed:

1. The patient should be thoroughly examined physically and the urine tested previous to anæsthetization, to insure that no contraindications to administration are present.

2. The patient's fears should be allayed and confidence gained.

3. When possible anæsthesia should be induced before going into the operating room.

4. All instruments and appliances to be used at the operation should be concealed from the patient's view.

5. All necessary implements and instruments and restoratives to be used in case of accident should be at hand and in readiness for use; and also out of the patient's sight. These should include a hypodermic syringe, in good working order, or loaded; strychnine, atropine, camphor in oil, and some active preparation of digitalis; also ammonia and nitrite of amyl; and proper forceps for drawing out the tongue should it fall back upon the larynx.

6. No talking nor noises, nor rattling of instruments should be allowed.

7. There should be an abundance of warm fresh air in the operating room.

8. Have at hand a towel or basin to receive vomitus; and if vomiting occurs see that the head is not raised but turned to the side, that no particles of anything may enter the trachea.

9. Remove false teeth, chewing gum, tobacco, or other material from the mouth before beginning anæsthetization.

10. Bare the neck and chest that respiration may be unembarrassed, and closely watched.

11. Loosen all constricting garments or coverings about the body so that respiration may be unimpeded, and the circulation unobstructed.

12. Do not administer, if by choice, immediately after a full meal (danger of persistent vomiting), or after a long fast (danger of acetonuria).

13. Anoint the nostrils and lips with petrolatum to prevent irritation and swelling.

14. Cover the eyes with a wet cloth to prevent irritation of the conjunctiva.

15. A hypodermatic injection of morphine previous to administration is said to render the process of inhalation quieter, and to lessen, and in some instances prevent, the stage of spasm and rigidity nearly always present in the strong and robust, while it is also believed to antagonize the paralytic action of the chloroform, and to prevent the shock succeeding anæsthetization and the operation performed.

16. The "drop by drop" method upon an Esmarch inhaler should be used by preference.

17. The administration should never be pushed; it is always dangerous at best; gradual anæsthesia should be sought always.

18. Respiration should be closely watched, for it gives the earliest and most reliable warning of approaching vaso-motor depression, or paralysis of heart or lungs.

19. Heat should be applied to the patient's body and limbs, if practicable, when marked lowering of temperature occurs, especially with ether.

20. Chloroform and ether should be absolutely pure; only approved and labeled anæsthesia qualities should be used.

21. Chloroform should not be used near open gas or coal flames lest decomposition take place with the liberation of irritant poisonous gases (chlorine, hydrochloric acid, and carbonyl chloride). Good ventilation, and a cloth wetted with ammonia being in the room lessen the danger from such decomposition.

22. Ether should not be used near a flame lest an explosion result. Ether should not be used nearer than six (6) feet from an open light and always below the level of the flame. Ether, being heavier than air, settles low. This and the preceding caution (21) is necessary on account of the necessity of using chloroform and ether in the home.

23. Not more than 2 per cent chloroform vapor should be used; there should be at least 98 per cent of air.

24. Under ether 70 per cent of ether vapor and 30 per cent of air are the best proportions for administration.

25. The mask should be held from 3 to 6 inches from the face with chloroform; closer with ether.

26. Operation should never be begun until the corneal reflex is abolished, as shown by the insensitive conjunctiva, and muscular relaxation has set in. Disregard of these has caused many deaths, through reflex stoppage of the heart under the stimulus of the scalpel. Extreme muscular relaxation is undesirable and generally dangerous.

27. No matter how trivial the operation it should not be begun until the proper anæsthesia stage is reached.

28. In operations about the mouth blood must not be allowed to enter the air passages.

29. In the aged and in those who have a weak heart or existing acute pulmonary disease the greatest of caution should be exercised.

30. Only a trained anæsthetist should administer anæsthetics.

31. The anæsthetist should confine himself solely to his work, and absolutely pay no attention to the operation, or other distractions.

32. Wilcox has well epitomized the situation in these words: "It should always be remembered that from satisfactory anæsthesia to toxic manifestations there is but a very short distance and a brief time."

Resuscitation from Anæsthesia Accidents from Chloroform and Ether.

It cannot be too strongly emphasized that great care should be exercised in the administration of these anæsthetics. Never more than 2 per cent of chloroform should be present in the inspired air, whereas the air may contain from 60 to 70 per cent of ether usually with safety. Death may occur suddenly from cardiac paralysis under ether, though asphyxia is the usual cause of death; under chloroform circulatory paralysis or paralysis of breathing may be the cause. Such being the case, artificial respiration, while indicated in both accidents, more often succeeds in resuscitating the paralysis of breathing by ether. The anæsthetist constantly and carefully should watch the respiratory movements, and, as far as possible, the pulse. Sudden pallor of the countenance and sudden and complete dilatation of the pupils are signs of gravest danger. Stertorous breathing is the danger signal of respiratory paralysis, and when it occurs the anæsthetic should be withdrawn at once and the chest vigorously slapped (Howe) until respiratory movements become free again. Ether is much safer than chloroform because failure of respiration, the usual cause of ether death, is easier to rectify than circulatory paralysis, which is farther beyond the power of the physician to remedy. In either case every approved method of artificial respiration should be instituted at once.

If the accident be due to threatened respiratory paralysis the countenance will be flushed or cyanotic. Then the recumbent attitude should be maintained. If due to circulatory embarrassment the face assumes a sudden and peculiar shade of pallor. Then the body should be immediately inverted head downward. This allows blood to pass freely to the brain, arouses vaso-motor activity and relieves the heart. If the patient is still breathing, even ever so little, inhalation of ammonia or nitrite of amyl should be used, and atropine, strychnine, and digitalis injected at once. The two latter in the order named are probably the most valuable. The use of alcohol is questionable, as small quantities do no good and large amounts aid in embarrassing respiration. External heat should be applied and cold affusions avoided. Ether injections are advised in cardiac paralysis from chloroform, but obviously they should cautiously be employed; in most instances omitted. Adrenalin, on account of asserted tendency to cause ventricular fibrillation, should not be employed. Under any circumstances, arising from either chloroform or ether poisoning, artificial respiration should not be forgotten. It has resuscitated after an hour of almost complete dissolution. Rhythmic compression and relaxation of the chest should be performed in as close imitation of natural breathing as possible. The tongue should be grasped by the tip with forceps and rhythmically drawn in and out several times a minute. The lower jaw should be elevated and held forward, and all mucus should be cleared from the mouth constantly. Forcible and sudden dilatation of the anal sphincters has been successful in arousing from chloroform narcosis, operating probably by stimulation of the sympathetic and exciting vaso-motor activity. In chloroform poisoning Hare advises that, while the head is held downward, bandaging of the limbs and abdominal compression by compresses should accompany artificial respiration. Opening the abdomen and massaging the heart has been advised when other means fail; during abdominal operations this can easily be resorted to.

Children bear chloroform anæsthesia better than adults; women better than men (1 to 6); feeble persons and those reduced by long illness better than the robust and healthy. The latter is disputed by some. It seems, also, that anæsthesia for operations upon diseased parts is better borne than when employed after accidents. Probably the shock and terror attending the latter have much to do with the untoward action of the anæsthetic.

The vomiting after chloroformization often may be relieved by the inhalation of vinegar. When acetonuria occurs large doses of sodium bicarbonate are indicated.

Comparison of Ether and Chloroform.—Chloroform has been very largely used by inhalation as an anæsthetic agent, and from the small quantity required, the promptitude with which it influences the system, its rather pleasant action, its more agreeable and less persistent odor, its moderate price, and the facility with which it may be administered, many in some sections of this country, notably the South and East, prefer it to ether, notwithstanding its greater danger. On the continent it seems to be losing ground, ether being preferred. The fact that chloroform is a much

more dangerous anæsthetic, producing fatal results about four or five times as often as ether, makes the latter the more desirable anæsthetic to use in all operations where it is desired to produce general anæsthesia. The majority of surgeons, and many of those who use chloroform, admit the greater safety of ether. Dr. Thomas Jones, of St. George's Hospital, London, who, in the course of eleven years, had administered chloroform to over 6,000 individuals, declared that if he were unfortunate enough to have to be anæsthetized, nothing could induce him to take chloroform. Howe administered chloroform in 5,000 cases without a death; Laurie (in India) reports a series of upward of 40,000 without a single death. In obstetrics, however, chloroform is remarkably free from dangerous results, much more so than in any other condition, and is always preferred to ether in obstetrical manipulations.

A comparative table will show the advantages of ether over chloroform, while it will be observed that if equally as free from danger as the former, the latter, from its pleasanter and prompter effects, would be far preferable to the former.

Ether	Chloroform.
Unpleasant odor.	Agreeable odor.
Unpleasant to inhale.	Pleasant to inhale.
Inflammable, and can not well be used around fire and lights.	Non-inflammable and ordinarily safe around fire and lights. In direct contact with gas flames it decomposes, liberating chlorine, carbonyl chloride and hydrochloric acid, all poisonous irritants.
More irritant to the air passages.	Less irritant to the air passages.
May be given more rapidly.	Must be slowly administered.
Air should be excluded as much as possible while administering.	Air to the extent of at least 98 per cent should be mixed with the anæsthetic vapor.
Its vapor may be inhaled almost in full strength, about 70 per cent being mostly employed.	Not more than 2 per cent with the inhaled air is safe.
Reduces temperature several degrees.	Less reduction of temperature.
More apt to occasion pugnacity, or lascivious or vulgar talk.	More apt to render the ideas and visions pleasurable, the incoherent talk being of a pleasant and not vulgar character.
Increases arterial tension.	Decreases arterial tension.
Not contraindicated by mere feebleness of heart.	Not admissible in weak or fatty heart.
More irritant to the kidneys and lungs.	Less irritant to the renal and pulmonary tissues.
Action less prompt and more transient.	Effects more prompt and more prolonged.
Comparatively free from danger.	Always dangerous.
Kills chiefly by respiratory paralysis; occasionally by heart failure.	Kills chiefly by circulatory paralysis; sometimes primarily by asphyxia.
Danger easily detected by color of face and ears, and state of pulse in sufficient time to resort to artificial respiration, by which death may be averted.	Danger signs, as of pulse, pallor, etc., exhibited as quickly as with ether, but too late to be of value if cardiac paralysis has occurred.
Death occurs in proportion of about 1 to 16,000.	Death occurs in proportion of about 1 to 3,000.
Claimed seldom to be dangerous when properly administered.	Admitted to be dangerous, even by its advocates.
Should always be preferred in long operations.	Preponderance of opinion in favor of never using where ether may be employed.
Less used in obstetrics.	Preferable in obstetric manipulations.
Accredited with a larger number of post-anæsthesia deaths.	Has fewer post-anæsthesia deaths.

ÆTHYLIS BROMIDUM.

Ethyl Bromide. (Formula CH_3CH_2Br.)

Description.—A colorless fluid of a chloroform-like odor, and neutral reaction. It should evaporate rapidly and leave no fatty feeling when poured upon the hand. It decomposes readily in sunlight, air, or when near a flame. ☞ *It should not be confounded with ethylene bromide*, a dangerous chemical.

Action and Therapy.—Owing to its instability, and its depressing qualities this substance is an undesirable, though potent, anæsthetic. It acts rapidly, a few whiffs causing general anæsthesia. It has been advised for short operations, examinations, and painful gynecological manipulations; but is totally unsuited for major operations. Bromide of ethyl mitigates the pangs of labor, but chloroform is safer. The practice of allowing the patient to anæsthetize herself by holding the mask, upon the presumption that she will drop it when overcome, is to be condemned as careless and favoring lack of diligence on part of the operator. Death has frequently occurred from this drug, especially when used in dentistry; in other instances, tetanic nervous disturbances have ensued. It should, therefore, be little favored as an anæsthetic. The method of using it is to place the full dose (45 minims to 3 fluidrachms) upon the inhaler at once and administer in close contact with the mouth and nose.

ÆTHYLIS CHLORIDUM.

Ethyl Chloride; Hydrochloric Ether.—(Formula: $CH_3\ CH_2\ Cl$).

Description.—A very volatile mobile colorless liquid having a characteristic ethereal odor and a sharp burning taste. It vaporizes at ordinary temperatures. ☞ Caution.—Ethyl Chloride is very inflammable and must not be used near an open flame or fire.

Action and Therapy.—*External.* Employed chiefly as a local anæsthetic for transient effect and quick minor operations, as incising the skin, opening abscesses, boils, etc., and to some extent in dentistry to obtund the gums so that forceps may be painlessly applied. It is sprayed upon the parts by means of a specially constructed tube, the heat of the hand and the compression of the tube being sufficient to eject a small stream of vapor through a pin-hole opening in the glass. Freezing takes place almost at once, and after its effects are over some aching pain is experienced, as is usual after refrigeration, and sometimes sloughing occurs. It is a most useful office adjunct for local use.

Internal. Ethyl chloride also produces general anæsthesia when inhaled. Insensibility takes place rapidly and is very fleeting, so that major operations cannot be performed under it. But it has an advantage over ether or chloroform in that small operations not justifying the use of the latter can be performed and the patient recover immediately upon removal of the mask. In this way time is saved and detention of the patient is not necessary. It is not suitable when muscular relaxation is desired, for it seldom produces such an effect. It is claimed that it occasions very little change in the pulse or breathing, nor does it affect the pupillary or corneal reflexes, except in the very young. The quick return to consciousness, and the relative infrequency of vomiting, are claims of advantage made for it. It must not be assumed, however, that it is without danger, for deaths in about the same proportion as for chloroform have occurred from its use. When cyanosis occurs the administration of the anæsthetic should be stopped at once; and an unfortunate quality of it is that when accidents

take place from it they happen very suddenly. Ether is always to be preferred to this anæsthetic. In administering it a specially constructed mask is used, or an improved one may be made, so that the vapor can be passed directly down upon a pad of absorbent cotton or gauze and deeply inhaled. The mask should at first be closely applied, and later air admitted. Not over 30 to 45 minims should be required, or used upon children; nor over 60 to 75 minims for strong adults. The container is often graduated so that the amount consumed may be estimated.

AGAR.

A dried substance of mucilaginous character abstracted from several species of sea weeds (marine algæ) growing along the coast of Asia. Most of it comes from Japan. *Dose*, 1 to 4 drachms.

Common Name: Agar-agar.

Description.—Agglutinated membranous pieces, tough or brittle accordingly as it is damp or dry. The pulverulent form is most commonly used. It is a coarse, buff-colored granular powder, having practically no odor or taste. It swells to a soft magma in the presence of water.

Action and Therapy.—Agar has no action upon the human body nor is it in turn affected by the digestive ferments or intestinal flora. It has the property of absorbing moisture and swelling to a soft mass, and for this purpose is given in constipation as a mechanical laxative; rendering the best service when intestinal secretion is scanty, and in consequence, the feces are abnormally dry. From one teaspoonful to two heaping tablespoonfuls may be given once or twice a day in dry form alone, or mixed with some cereal at meal-time. Biscuits, bread, and crackers are prepared from it and may be procured in the general trade. Agar is also used as a culture medium in making labaratory cultures.

AGARICUS.

The fungus *Amanita muscaria*, Persoon; (*Agaricus muscarius*, Linné.) (Nat. Ord. Fungi.) An extremely poisonous fungus found in the pine forests of Europe.

Common Name: Fly Agaric.

Principal Constituents.—*Muscarine*, a deadly alkaloid, and pilzatropin, its physiologic opposite.

Preparations.—1. *Tinctura Agarici*, Tincture of Agaricus (Fresh fungus, ℥j; strong alcohol, Oj). *Dose*, 1/30 drop.

2. *Muscarine*. *Dose*, 1/30 to 1/12 grain.

Action and Toxicology.—The chief toxic action of agaricus is probably due to muscarine, which produces ptyalism, weeping, vomiting, depressed circulation, difficult breathing, muscular weakness, minutely contracted pupils, tetanic contraction of the viscera with subsequent relaxation of the bowels, when violent peristalsis takes place, paralysis and death. Muscarine is the direct antagonist to atropine.

Closely allied to Agaricus is *Amanita phalloides*, Fries or *Death Cup*. Common in the United States and the cause of many fatal poisonings. Gastro-enteritis with choleraic diarrhœa occurs, with death within two to four days. It contains muscarine and a toxalbumen *phallin*, both of which are deadly agents. While salt abstracts the latter, there is no known antidote after it has been absorbed.

Therapy.—Agaricus is seldom used, but possesses undoubted power over the secretions and the nervous system. The chief uses that have been made of it, and for these even the muscarine sulphate or nitrate have been mostly employed, are in colliquative night-sweating from debilitating diseases, and profuse sweating in the daytime; and to restrain the excess of urine in polyuria, or so-called diabetes insipidus.

Scudder suggested a tincture of the fresh fungus for "involuntary twitching of the muscles of the face, forehead, and even of the eyes, so that objects are not well seen because they seem to move; drawing of the tissues of the forehead and nose; pressing pain in the occiput and an inclination to fall backward." Webster thought it useful in typhoid conditions and spinal irritation when there is "tremor, restlessness, and desire to get out of bed." These indications are of homœopathic origin and have been but little followed by Eclectic practitioners.

Muscarine is used in atropine and belladonna poisoning, sometimes being employed in place of eserine (physostigmine).

AGRIMONIA.

The whole plant of *Agrimonia Eupatoria*, Linné (Nat. Ord. Rosaceæ). A common perennial in the United States, Canada, Europe, and Asia. *Dose*, 5 to 60 grains.

Common Names: Agrimony, Stickwort, Cockleburr.

Principal Constituents.—Tannin and a volatile oil.

Preparations.—1. *Infusum Agrimoniæ*, Infusion of Agrimony (℥j to Water, Oj). *Dose*, 2 to 3 fluidounces.

2. *Specific Medicine Agrimonia. Dose*, 5 to 60 drops.

Specific Indications.—Deep-seated colicky pain in lumbar region with uneasy sensations reaching from kidneys and hips to the umbilicus; atony or irritation of the urinary tract, with muddy, ill-smelling urine.

Action and Therapy.—A mild tonic and astringent, indicated as above-mentioned, and of considerable value in cystic catarrh and nephritic irritation from the presence of gravel. It is also sometimes used as a gargle, and internally for mucous profluvia from any of the mucous structures of the body. The infusion is especially useful. We have known it to give relief in abdominal pain due to faulty intestinal digestion. Dribbling of urine in old persons is said to be relieved by agrimony.

ALCOHOL.

Spirit of Wine.

A liquid containing a fixed amount of absolute (Ethyl) alcohol ($C_2 H_5 . OH$).

Description.—A mobile transparent and colorless liquid, volatile, of slight aromatic odor, and a sharp burning taste. It mixes with water, chloroform or ether, glycerin and many oils. It should be kept in a cool place, away from fire, and in closed containers.

Preparations.—1. *Alcohol Dilutum*, Diluted Alcohol (Proof Spirit). Equal parts by volume of alcohol and water.

2. *Alcohol Dehydratum*, Dehydrated Alcohol (Absolute Alcohol). 99 or more per cent pure $C_2 H_5 OH$.

3. *Spiritus Frumenti*, Whisky, 44 to 55 per cent absolute alcohol.
4. *Spiritus Vini Gallici*, Brandy, 44 to 55 per cent absolute alcohol.
5. *Vinum Album*, White Wine, 9 to 15 per cent alcohol.
6. *Vinum Rubrum*, Red Wine, 9 to 15 per cent alcohol.
7. *Vinum Xericum*, Sherry Wine, 15 to 22 per cent alcohol.
8. *Vinum Portense*, Port Wine, 15 to 24 per cent alcohol.

Specific Indications.—Collapse and sudden depression of the vital powers; prostration, with soft, feeble pulse; hurried respiration and irregular heart action; prostration with dry tongue, low muttering, or wandering delirium, tremor, subsultus, and insomnia; delirium tremens of the depressive type when the gastric powers fail. Antidote to phenol.

Action and Toxicology.—Applied to the skin, alcohol causes a cooling sensation, but if evaporation be prevented heat and irritation follow. If too long in contact, inflammation may result. The skin and mucosa are hardened by it, and the latter corrugated, owing to coagulation of albumen and the abstraction of water from the tissues. Some fat is also removed. When first applied to the skin it contracts the arterioles, excites, and then paralyzes the peripheral nerves, and may therefore act as a slight anæsthetic. Taken into the stomach in small amounts it whets the appetite, provokes the flow of gastric juice, and increases digestive power and absorption. Owing to the dilatation of the arterioles, slight congestion of the mucous tissues occurs, by which all the digestive secretions—salivary, buccal, and gastric—are increased. If continuously used, however, this excessive secretion results in a catarrhal state, and continuing induces atrophic changes in the gastric glands with hyperplasia of the gastric connective tissue. Pepsin is precipitated by it and thus adds to the digestive impairment. The resultant gastric catarrh causes sour stomach, heart-burn, eructations, and the peculiar retching and morning vomiting of the drunkard.

Within the last few years studies upon alcohol have completely reversed the former conception of its effects upon the nervous system and the circulation. Instead of stimulation, depression is its dominant action. The effects of moderate doses differ from large amounts in degree only. The apparent effects from alcohol are increased cerebral activity, the senses seemingly becoming more acute and the mental actions more energetic, and a corresponding increase of activity of the general economy takes place. Now we are told that this activity is not real, but only apparent; that instead of stimulation the brain and nervous system are depressed—and that the real condition is one of loss of control due to "depression of the inhibitory nervous apparatus." Hare declares "that so far as the brain is concerned, it does not increase the vigor of thought nor its depth, nor does it enable a man to work out a problem that is difficult. On the contrary, it benumbs the activity of the mental process." In large doses it is generally accepted that the brain and cord are depressed, and that muscular sense and tactile power are impaired; and that, through general loss of sensation, there is perverted mental action and judgment, incoördination of movement which results in staggering and uncertain motion, and the person is said to be drunk.

In small amounts alcohol increases the heart's action probably through depression of the inhibitory apparatus. It also contracts the splanchnic and intramuscular arterioles while the capillaries of the skin are dilated. This causes flushing of the skin. A betterment in the distribution of the circulation and the protecting and increased bacteriolytic power of the blood under alcohol administration is now thought to be the important action in disease, instead of the stimulation formerly taught.

Taken in moderate amounts alcohol is scarcely eliminated, but is destroyed in the body by oxidation. It thus imparts force and energy. It refreshes the exhausted system and by yielding this force acts in lieu of food, though it is not known to contribute to the building of a single cell or fibre of the animal structure. It also acts as food in that it retards, by its own oxidation, similar destruction of fats and proteids of the body, and thus retards tissue waste. Bodily heat is created by the oxidation of alcohol, but heat radiation, through increased capillary circulation and dilatation, and depression of the vital powers prevent a rise in temperature. Large doses quickly lower the body heat; and this is more pronounced if fever be present. Taken in quantities too large to be "burned up" in the body, alcohol is eliminated by the lungs and skin and the kidneys and bowels.

Contrary to popular notion, alcohol does not protect from the influence of cold. This is shown by the experience of Arctic explorers; and by the ease with which drunkards are frozen to death. Nor does it protect one from the effects of heat. The facility with which topers are attacked by and succumb to sunstroke, heat exhaustion, and epidemic disorders, proves conclusively the deleterious effects of its habitual use; injuries do not heal so readily in the inebriate as in the temperate, chloroform is not well borne by them, nor can they as well withstand the shock of surgical operations. On the other hand, enormous quantities of alcohol may be ingested by those unaccustomed to it, when meeting with accidents, or suffering from the effects of hemorrhages, bites of insects and serpents, when suddenly depressed, and in convalescence from acute diseases. Infants and old persons bear alcoholics well.

Toxicology.—*Acute Alcoholism.* In acute poisoning by alcohol cerebration is suspended and profound insensibility takes place. The pulse is rapid and feeble, the face pale, the pupils usually dilated and muscular prostration is complete. Breathing may be stertorous, but not so strongly as in opium narcosis. Finally there is arrest of breathing and the heart becomes paralyzed. A person "dead drunk" should be treated as if poisoned and not allowed to "sleep off" the effects.

It is sometimes extremely difficult to differentiate between acute alcoholism and apoplexy, cerebral concussion and opium poisoning. As alcohol is so widely used in one form or another, the odor upon the breath cannot be relied upon as diagnostic. As a rule in alcoholism the skin is cool; in apoplexy and opium poisoning, warm or hot; in the latter two the pulse is slow and full, pupils contracted (opium) or unequally dilated (apoplexy), and unconsciousness is complete; there is facial palsy and exalted temperature in apoplexy.

The treatment consists in emptying the stomach by means of the stomach-pump, if possible, and the administration of aromatic spirit of ammonia or spirit of mindererus, followed by digitalis and strychnine hypodermatically. If the skin is cold and clammy, atropine also should be used. Artificial heat should be applied, with cold applications to the back of the head. In mild cases a half ounce of vinegar will often quickly restore the patient.

Chronic Alcoholism takes on two types so far as the final pathological results are concerned: sclerotic and steatotic degeneration. The liver receives the brunt of the effects and fatty and atrophic changes take place, with associated gastric and constitutional malnutrition. Few organs escape. Cirrhosis of the liver, chronic nephritis, degenerative heart disease, and many other tissue changes occur. The mentality deteriorates and moral degradation reaches a low ebb. Peripheral neuritis and subsequent paralysis are common. The appearance of chronic alcoholics is well known and pitiable. The sodden pallor and fatty bestiality of the one, and the purplish, red-faced and pimply besotten countenance and swollen blue lips of the other, are types so common as to be easily recognized. If not too far advanced some good may be done if careful home treatment under strict surveilance is carried out, but as a rule institutional treatment is most successful, if one can find a sanitarium where honest treatment is accorded the patient.

Therapy.—*External.* Alcohol is a local antiseptic, rubefacient, refrigerant and astringent according to the manner of its application. Strong alcohol has less germicidal power than when diluted. Applied to the skin and its evaporation prevented by means of compresses, it acts as a local stimulant and rubefacient; if allowed to evaporate or its volatilization hastened by fanning, it is refrigerant. Used in the last-named manner it is a good cooling agent for bruises and contusions and inflamed, swollen, and rheumatic joints. Diluted about one half, it provides a good dressing for orchitis, arthritis, bruises, and superficial inflammations, Liniments containing it are frequently effective rubefacients to assist in relieving pain and aiding absorption of inflammatory products in so-called chronic rheumatism, lumbago, myalgia, pleurodynia, and similar disorders.

Absolute alcohol will quickly prevent cauterization by phenol or carbolic acid. Washing the skin with alcohol to which has been added a small portion of a solution of alum hardens the tissues and prevents bed sores and excoriations. Used in full strength, alcohol is a fair hemostatic for the oozing of blood in abrasions. Applied to aural polypi and unhealthy granulations of the tympanum, it causes their shrinkage by condensing the albumen and abstracting water. Care should be taken not to dry out the membrana tympani. Foltz considered absolute alcohol a specific for tympanic cholesteatoma. A solution of boric acid in absolute alcohol is an ideal cleansing lotion and healing application in purulent otitis media.

A wash of alcohol and water forms a good antiseptic for aphthous ulcers and some forms of sore throat. Touching a tender spot in incipient sore throat with pure alcohol will sometimes immediately cause a disappearance of the soreness.

Internal. Formerly the use of alcohol as an internal medicine was very extensive as well as abusive. Now the tendency is toward restriction, or the absolute discard of it altogether. The fact of the matter is that it should occupy a middle ground; and like every other agent that has been employed with any good results at all, it has its place in medicine, and that place is specific. Concerning the use of alcohol one should neither be swayed by the opinions and statistics of its advocates nor the maledictions of its opponents. Sound therapeutic judgment should be exercised by the

administrator himself. He should recognize that alcohol is a two-edged blade and may cut for good or for worse. He must realize that it is a habit-forming agent and one popularly and gratefully accepted, and therefore dangerous. Indiscriminate use will bring its penalties, and upon the physician too often rests the blame for its ill results.

Alcohol is an *emergency remedy* or temporary expedient. It should never be used unless absolutely indicated. Even though it may do much good, it may be very unwisely used in doing that good. As a rule its use should be avoided in young adults and adolescents, lest a habit be begun. It is a medicine chiefly for acute disease. There are, however, a few chronic conditions in which it may be given safely and beneficially. In old persons, with failing powers and lack of appetite, given for a brief period in small doses alcohol makes the patient better by increasing the desire for food and the function of digestion. In advanced phthisis and cancer (except of the stomach or liver) it gives comfort and promotes assimilation and rest. In these states of great debility and wasting of tissue it acts both as a food and a conservator of power. As long as it favors digestion, acts kindly, and lessens rapid waste it is doing good. If it occasions unpleasant symptoms it will aggravate the general condition, especially in phthisis. We do not believe it is ever indicated in incipient phthisis, and in this stage it can sometimes do incalculable harm. It is a matter of clinical record that many cases of tuberculosis have their incipiency in the continued use of alcoholics and the carelessness which the habit induces. While in advanced phthisis it may or may not shorten the duration of life, it gives rest and comfort, and no habit is fixed that can in any way harm the sufferer. A half ounce or less of whisky or brandy may be given in milk or eggnog; or if cod-liver oil is being assimilated, it may be given with it. In the gastric debility of old persons, its use should be discontinued as soon as the appetite and digestion begin to improve, and only very small amounts should be given at any time.

As a rule alcohol should be restricted to sudden depression in acute disease; and to those accustomed to its use in health who, suddenly attacked by an acute invasion, would suffer greater danger or die if the accustomed alcoholic were entirely withdrawn. In pneumonia, and in low fevers in such individuals, the complete withdrawal of alcohol may mean death. In delirium tremens of the depressive type its sudden denial spells disaster, if the trouble depends chiefly upon the failure of the stomach to take and appropriate food. In such instances alcohol is an imperative necessity, and small doses must be given at short intervals until the gastric irritability is overcome and food is retained. If possible it should then be quickly replaced with capsicated broths or other easily assimilated nutriment. If the delirium is such that the force of the inebriation is spent upon the cerebrum directly without much disturbance of the gastric function, alcohol will aggravate the disorder.

In low forms of fever, alcohol sometimes determines the difference between life and death. If there is great prostration and impending collapse, with rapid, soft and feeble pulse, and the tendency is toward fainting, and there is low muttering delirium, subsultus, dry tongue, and sleeplessness, the patient must be stimulated or he will die. Nothing so quickly improves

this depression as alcohol. If, under its use, the pulse becomes stronger, slower, and increased in volume, the delirium is calmed, the tongue and skin become moist and sleep is induced, the drug is doing good; if the unpleasant symptoms grow worse, it should be discontinued at once. The dose should be small—much smaller than has generally been advised in the past, when it was directed, in pneumonia and fevers, to give alcohol until it could be smelled upon the exhaled breath. From 2 to 4 drachms, repeated as necessary, is far more effectual and manifestly safer than 1 or 2 ounces.

Alcohol is to be given in sudden collapse from hemorrhage or from shock. It is usually given in fullest dose in the depression and collapse caused by bites of serpents and stings by poisonous insects. We believe that its use is often unwisely overdone in these conditions; nevertheless it is a custom that is not likely to be eradicated for some time to come. Here as elsewhere in collapse and depression small but repeated doses are more rational than the large amounts, for it must be remembered that alcohol is always depressant—somewhat depressing to some parts of the system in all doses and certainly powerfully depressant in excessive quantities.

A whisky sling frequently breaks up an acute invasion of the lungs by a cold, or pleuritic attack induced by exposure and chilling of the surface. The diaphoretic effects from the dilatation of the cutaneous capillaries and the revulsion of blood from the viscera to the skin, the patient being kept in bed, are most effectual. If of microbic infection, as in true lobar pneumonia, it will have no effect toward aborting the illness. As such conditions can be met, however, by a stimulating diaphoretic or by the special sedatives, alcohol should not be used when these are available, for the habit-forming qualities of the drug must ever be kept in mind.

Alcohol has been advised as the best theoretical antidote for poisoning by phenol or carbolic acid, and it has also been more recently condemned as useless except for external use in such accidents. It will take the crucial tests of time and clincial use to determine its value in this respect.

ALETRIS.

The rhizome of *Aletris farinosa*, Linné, gathered after the plant has flowered (Nat. Ord. Hæmodoraceæ). United States. *Dose*, 5 to 60 grains.

Common Names: Blazing Star, Star Grass, Starwort, False Unicorn root.

Preparation.—*Specific Medicine Aletris. Dose*, 5 to 60 drops.

Action and Therapy.—Owing to the confusion that has long existed resulting from the unwitting substitution of aletris for Helonias (Chamælirium) the virtues of the latter, as a remedy for various disorders of the female reproductive organs, have been ascribed also to the former. It is probably nothing more than a gentle stomachic and tonic, and as such may be employed to promote the appetite and aid digestion. It is accredited with value in atonic dyspepsia, with flatulence and borboryginus. Even the carminative effects thus ascribed would seem to belong to helonias rather than to aletris, which is neither bitter nor aromatic like the former.

ALLIUM.

The bulb of *Allium sativum*, Linné (Nat. Ord. Liliaceæ). Sicily, Asia Minor, and Central Asia; cultivated also in the United States and Europe. *Dose*, 1 to 2 drachms.

Common Name: Garlic.

Principal Constituents.—Chiefly an acrid volatile oil, containing sulphur compounds.

Preparations.—1. *Syrupus Allii*, Syrup of Allium. *Dose*, 1 to 2 fluidrachms.
2. *Succus Allii*, Juice of Allium. *Dose*, 1 fluidrachm.

Action and Therapy.—*External.* Stimulant and rubefacient. Garlic poultice, like that of the onion, may be applied with benefit in acute respiratory and abdominal inflammations. It sometimes excites a flow of urine in atony of the bladder, and in gastro-intestinal catarrh it is as efficient as the spice poultice. Applied to the feet it has been successful as a revulsant in brain and cerebro-spinal disorders of children, associated with convulsions.

Internal. Expectorant and diuretic. The juice or the syrup (made by covering bruised garlic with sugar) is often effectual in common colds, especially when tending to become chronic or frequently repeated. It should not be used when there is marked irritation or inflammation. As a food, garlic is a stimulant to digestion if not used to excess. As such it is a common ingredient of certain meat sausages.

ALLIUM CEPA.

The fresh bulb of *Allium Cepa*, Linné (Nat. Ord. Liliaceæ). Common in cultivation everywhere.

Common Name: Onion.

Principal Constituent.—A colorless oil, composed chiefly of a sulphur compound ($C_6 H_{12} S_2$).

Preparations.—1. *Tincture of Red Onion.* 5 to 60 drops.
2. *Syrup of Onion. Dose*, 1 to 2 fluidrachms.

Action and Therapy.—*External.* Onion is rubefacient. A poultice of onion with vinegar gives relief to inflamed corns and bunions. Roasted onion makes an efficient poultice for acute broncho-pulmonic inflammations, especially of young children, when local applications are desired. Onion poultices are objectionable only when made too heavy, carelessly applied, or when applied to open surfaces.

Internal. Onion is stimulant, expectorant, and diuretic. A syrup of onion, prepared by drawing the juice with sugar, is a very effectual expectorant cough medicine for infants, young children, and old persons. If given in moderate quantities it is very soothing; if too freely administered it may cause nausea and disorder digestion. It, together with the onion poultice, are among the good things inherited from domestic medication, and might well be considered in preference to less safe and less depressing pulmonic medication. A tincture of red onion is useful in gravel and other urinary disorders with passages of blood, pus, and mucus. The dose is from 5 to 10 drops in water. It is sometimes given with an equal quantity of tincture of Xanthium Strumarium.

ALNUS.

The recent bark of *Alnus serrulata*, Aiton (Nat. Ord. Betulaceæ). A shrub of the United States east of the Mississippi River.

Common Names: Tag Alder, Red Alder, Black Alder, Smooth Alder, Common Alder.

Principal Constituents.—Oils, tannin, and resins.

Preparations.—1. *Decoctum Alni*, Decoction of Alnus (bark ℥j, Water, Oj). *Dose*, 1 to 2 fluidrachms. Chiefly used as a local application.

2. *Specific Medicine Alnus. Dose*, 1 to 60 drops.

Action and Therapy.—*External.* The decoction is one of the best of local applications for rhus poisoning. We have observed rapid cures with it. It stains the skin. It is also a useful wash for nursing sore mouth of mothers, and should be given internally at the same time.

Internal. A good remedy to promote waste and repair and to improve nutrition. It is astringent and a bitter tonic, of use in gastric indigestion, with relaxed stomach walls and imperfect peptic function. Its alterative properties are best displayed in pustular eczema and recurrent crops of boils. Passive hæmaturia is sometimes controlled by its astringent action.

ALOE.

The dried juice of the leaves of several species of Aloe: (1) *Aloe Perryi*, Baker; (2) *Aloe vera*, Linné; (3) *Aloe ferox*, Miller. (Nat. Ord. Liliaceæ). Barbadoes, Africa and the Orient.

Common Names: (1) Socotrine Aloes; (2) Curaçoa Aloes; (3) Cape Aloes.

Description.—(1) Yellow-brown or black-brown masses, aromatic, bitter, and nauseous, half of which is soluble in water; powder, deep brown; aqueous solution yellowish. (2) Orange to black-brown masses, waxy, not aromatic; more than half soluble in water; powder, deep red-brown; aqueous solution, purplish red. (3) Red-brown or greenish-black, smooth, glassy masses, more than half soluble in water; powder, greenish-yellow (fresh), light brown (old); aqueous solution, pale yellow. *Dose*, 1 to 8 grains.

Principal Constituents.—*Aloin* (C_{14} H_{10}), resin, and volatile oil.

Preparations.—(1) *Aloinum*, Aloin (a very bitter, yellow-to-dark-yellow, finely-crystalline powder, soluble in water, slightly in ether). *Dose*, 1/12 to 1/2 grain.

2. *Pilulæ Aloes*, Pills of Aloes. (Each pill contains 2 grains of Aloes.) *Dose*, 1 to 2 pills.

3. *Tinctura Aloes*, Tincture of Aloes (10 per cent of Aloes). *Dose*, 15 to 60 minims.

Specific Indications.—Atony of the large intestine and rectum; mucoid discharges, prolapsus ani, ascaris vermicularis (Scudder). Difficult evacuation of the lower bowel when not due to fissure or inflammation.

Action.—Aloes is a slow-acting stimulating purgative, probably affecting only the lower bowel, notably the rectum. In small doses it is laxative. It strongly increases colonic peristalsis, but does not greatly increase the secretions of the intestinal glands, consequently the stools are feculent rather than watery, unless the dose be large. As it takes from 10 to 15 hours to operate, it should be administered in the early evening so that evacuation may occur in the morning. When given alone it causes considerable griping and often rectal fullness and heat. These may be modified by giving it in pill with soap or an alkaline carbonate, or with hyoscyamus, belladonna, or carminatives. Sulphate of iron slightly restrains its action and ipecac increases it. Applied to a denuded surface it operates the same as if taken internally, and administered to a nursing mother it purges the sucking child. By its stimulating action upon unstriped fibre, as of the bowel and uterus, and its tendency to excite the pelvic circulation producing pelvic congestion, it proves emmenagogue. It is a purgative for

torpor and debility, and should not be given to plethoric persons, nor when gastro-enteritis, or actively inflamed hemorrhoids are present; nor when pregnancy exists.

Therapy.—Aloes, in 1/2 to 1 grain doses, is a gastric stimulant of value in atonic indigestion, with obstinate constipation. It has had a large vogue as an after-dinner pill, but is now little used for that purpose. As a rule it is a good agent for use in atonic chronic constipation, but should never be exhibited in cathartic doses for this purpose. Aloes, or its derivative, aloin, is usually an ingredient of many favorite laxative pills, composed of varying amounts of either drug in combination with belladonna, strychnine, and ipecac, and sometimes with the addition of capsicum. One of the best of these is the "Lapactic pill." When sulphate of iron is indicated in chlorosis and anemia, aloes is generally combined with it. It has the effect of restraining the constipating action of the chalybeate. Aloes and iron are both very useful in delicate women who are subject to amenorrhœa or menorrhagia, with pelvic and intestinal torpor, poor appetite, and a weak circulation. As most of these cases are profoundly constipated, the explanation of the combination may be found in the laxative action of the aloes. When hemorrhoids are due to feeble venous return, small doses of aloes or aloin may improve conditions, but it should never be given when there is active hemorrhoidal inflammation. In very small doses aloin is useful in rectal prolapsus, due to pelvic debility and general ill-health. It is still a debatable question whether aloes influences the flow of bile. When, however, jaundice is coexistent with torpor of the hemorrhoidal veins, it may be improved by laxative doses of aloes or aloin. Aloes is a decidedly useful but much abused medicine in chronic or habitual constipation. As stated above only slightly laxative amounts should be used. When a purgative is needed for bowel impaction in the insane—particularly in hypochondriasis and melancholia—aloes is probably the best that can be given. The improvement in the mental state often will be commensurate with the betterment of the intestinal torpor.

ALTHÆA.

The decorticated dried root of *Althæa officinalis*, Linné (Nat. Ord. Malvaceæ), a plant of salt marshes, river banks, and moist, sandy soils. Europe, Asia, Australia, and Eastern United States.

Common Name: Marshmallow.

Principal Constituents.—Mucilage, starch, pectin, and *asparagin*, an odorless and colorless crystallizable body identical with *althein* and *agedolite*, found also in many other plants.

Preparations.—1. *Infusum Althææ.* Iufusion of Althæa. *Dose*, Freely.
2. *Decoctum Althææ.* Decoction of Althæa. *Dose*, Freely.
3. *Syrupus Althææ.* Syrup of Althæa. *Dose*, fl ʒj to fl ʒiv.

Therapy.—*External.* A soothing application to inflamed surfaces; and may be used as an injection for dysentery, acute vaginitis, and the acute stage of gonorrhea. A favorite gargle for irritated throat. Applied upon a compress, it is reputed to be comforting to painful piles.

Internal. An excellent lenitive and demulcent diuretic employed to soothe irritated and inflamed mucous surfaces, in hoarseness, cough due to faucial irritation, gastro-intestinal irritation and inflammation, and as a soothing drink in vesical and renal irritation and inflammation, acute

cystitis, strangury and gravel. If the mucilage chiefly is desired, an infusion should be prepared with cold water; if starch, with some mucilage is needed, a decoction. It may be given freely. A syrup of marshmallow is a good vehicle for pectoral medication.

ALUMEN.

Alum.—(Formulas: (1) Ammonia Alum [Al NH_4 $(SO_4)_2$. 12 H_2 O].
(2) Potassium Alum [AlK $(SO_4)_2$. $12H_2$ O]. The variety should be stated on the label.

Description.—Large crystals or fragments, or a white powder, colorless and odorless, with a sweetish astringent taste. Soluble in water, the Ammonia Alum being less readily dissolved than the Potassium type.

Preparations.—1. *Alumen Exsiccatum* (Exsiccated Alum), Dried Alum, Burnt Alum (Alumen Ustum). A white, odorless, granular, hygroscopic powder, having the characteristic taste of alum. It is largely anhydrous and should not contain more than 10 per cent of moisture; and the label should state whether it is prepared from Ammonium or Potassium Alum.

2. *Liquor Alumini Acetatis*, Solution of Aluminum Acetate. For local use.

Action.—Alum corrugates the skin and mucosa by precipitating albumen and decreasing secretion. Moreover, it penetrates the epiderm and attacks the albumen in the deeper tissues, causing contraction of the blood vessels and surrounding structures, and coagulation of the blood. It is, therefore, powerfully astringent and styptic. Small doses of it constipate, larger amounts (30 to 60 grains every 3 or 4 hours) cause purgation, while if the same quantities be given every 10 or 15 minutes it acts as a mechanical or irritant emetic. An ounce of alum in solution killed a man. The symptoms were those of an intense gastro-enteritis. Alum is not readily absorbed by the alimentary tract. Only when given intravenously does it appear to produce remote general effects—chiefly upon the kidneys, intestines and brain, causing degeneration, paralysis or convulsions, and death. It should never be used intravenously on account of the possible occurrence of a fatal thrombosis or embolism.

Therapy.—*External.* Alum is astringent, styptic, and mildly escharotic. Applied in full strength it will repress exuberant granulation. For this purpose it is the best agent to condense overgrown flesh around so-called "ingrown toe nail." Any sharp or irritating fragments of nail should be removed, under as aseptic precautions as is possible, the parts cleaned of pus and other secretions, and a small quantity of powdered alum packed in the cleansed pocket. It will cause marked shrinking and hardening of the parts, and subsequent trouble may be avoided by careful attention of the toilet of the nail. Alum may also be used to reduce the swelling of overriding gums and to destroy "proud flesh" in ulcers and burns. It must be remembered that alum attacks the enamel of the teeth, therefore its use upon the mouth and fauces must be guarded. In dilute solutions alum promptly checks ptyalism when not due to a paralytic state of the parotid duct. For the restraint of excessive secretion from any of the mucous surfaces a solution of 30 to 120 grains to the pint of hot water may be used as a wash. The use of a solution of alum one day and of borax the next is very effective in controlling leucorrhœa with lax vaginal walls. It is sometimes useful in gonorrhœa and gleet, when employed in weak dilutions. For relaxed conditions of the fauces and uvula it is often most effectual.

A very weak solution—about 20 grains of alum to the pint of sterile water—provides an admirable wet-dressing for the after-treatment of superficial burns and scalds. It is antiseptic, represses undue secretion and over-granulation, and minimizes the formation of scar-tissue. Alum, in hot or cold solution as preferred, is useful in pruritus vulvæ and pruritus ani. Dissolved in water, and alcohol subsequently added, alum makes a splendid lotion for bed sores, as well as to prevent them. The same may be used as a wash for frost-bites, chilblains, pedal, manual, and corporeal sweating. It is especially useful for colliquative night sweats and for bromidrosis. Alum lotions and ointments are valued by some for moist eczema, labial and preputial herpes, purpura, and in ulcerative stomatitis. The use of alum solutions for relaxation and soreness of the throat is not always advisable on account of imprisonment of deleterious matter, thus increasing the possibility of general infection. A severe bronchitis sometimes follows the use of an alum gargle or spray.

Alum in powder or strong solution is a prompt and efficient local hemostatic when the vessels can be reached by it. It acts by coagulating the blood, precipitating albumen and constringing the surrounding tissues, and by furnishing a crystalline mechanical support upon which the blood may clot. It may thus be used for capillary bleeding from cuts, small wounds and bites, spongy bleeding gums, for bloody oozing after the extraction of teeth, in epistaxis and upon bleeding hemorrhoids.

Internal. Internally, alum is astringent, hemostatic and emetic. As an emetic from 30 to 60 grains may be given well diluted or with molasses. It is seldom used for this purpose, but may be employed early in cases of narcotic poisoning when other emetics are not at hand. It is better adapted for spasm of the glottis and croupal conditions when secretions are free and loose. Even for such purposes it is now seldom employed. It is, however, exceedingly valuable in acute lead poisoning, which like other soluble sulphates it also antidotes. It is the best known agent for acute lead colic (colica pictonum). From 30 to 60 grains may be given every 3 hours. While a powerful astringent of tissues in moderate or large doses, it nevertheless provokes intestinal secretion; and in small doses it sometimes relieves constipation where there is marked atony due to habitual distention of the bowels with gas. For this purpose the following is advised: ℞ Alum gr. ij or iij, water ℥iv. Mix. Sig. One teaspoonful every 2 hours. For cough with tickling and irritation of the fauces King advised a mixture of alum ℥j, water and syrup of tolu aa ℥ij, camphorated tincture of opium ℥j. Mix. Give a tablespoonful 3 or 4 times a day. In the absence of other hemostatics, alum may be used to control hemorrhage from the stomach.

Liquor Alumini Acetatis is a clear colorless solution of an acetous odor and sweetish astringent taste. It contains from 7.5 to 8 per cent of basic aluminum acetate. It is a strong astringent solution used by some physicians in rhus poisoning, erysipelas, forming stage of boils and carbuncles, and upon septic wounds of the extremities. It should be dispensed in proportion of 1 fluidounce of the solution diluted with 7 fluidounces of distilled water. As it decomposes easily, it should be used only with the latter.

AMMONII BENZOAS.

Ammonium Benzoate.—(Formula: $NH_4 C_7 H_5 O_2$).

Description.—Plate-like crystals, or a crystalline white powder; to the taste saline, bitterish, and subsequently acrid, and having no odor or but a faint aroma of benzoin. It gradually decomposes in the air, evolving ammonia. It dissolves freely in water or glycerin, and less readily in alcohol. *Dose*, 5 to 30 grains.

Action and Therapy.—Ammonium benzoate is a mild antiseptic diuretic acting upon the bladder contents much like benzoic acid. It is to be used where there is renal torpor, with scanty, pungent, dark-red urine loaded with ropy mucus and phosphatic sediment. In the urinary incontinence of the aged, with irritation of the neck of the bladder and in subacute cystitis, accompanied by headache, debility, and pain in the loins and limbs, it may be given with hope of amelioration. From 5 to 15 grains, well diluted with water, should be administered 2 or 3 times a day.

AMMONII BROMIDUM.

Ammonium Bromide.—(Formula: $NH_4 Br$.).

Description.—A white granular or crystalline powder, or in transparent crystals, with a sharp, salt-like taste, and no odor. This salt absorbs moisture, but not enough to liquefy it. It is freely soluble in water and less readily in alcohol; more easily when each of these solvents is hot. *Dose*, 1 to 30 grains.

Specific Indications.—Tinnitus aurium from quinine; convulsive movements; convulsive cough.

Action and Therapy.—Ammonium bromide fulfills practically the same purposes as Potassium Bromide, which see. It is less depressing, however, than that salt, but somewhat more irritant to the stomach. In very large amounts or if long continued it will produce the unpleasant results of the excessive use of bromides in general—comprehended in the condition known as *Bromism*.

Locke advised bromide of ammonium for insomnia due to cerebral excitement. Foltz recommended it for nervous twitching or jerking of the eyelids and muscles of the eye, and for nervous deafness, and to relieve tinnitus aurium caused by the alkaloids of cinchona. Scudder used it as a nerve stimulant to enfeebled cerebral circulation, and to relieve irritation of the brain and spinal cord resulting in convulsions. He preferred it to other drugs in the treatment of epilepsy, employing it to remove predisposition to it, to control the attacks, and to prevent their recurrence.

Bromide of ammonium is useful in whooping cough, associated with convulsive action of the chest muscles or epileptiform movements of the limbs. Doses of 1 grain for each year of the child's age may be given several times a day.

AMMONII CARBONAS.

Ammonium Carbonate.

A mixture of Ammonium Carbonate ($NH_4 HCO_3$) and Ammonium Carbamate ($NH_4 NH_2 CO_2$) in such proportions that the yield of NH_3 is about one-third the per cent of the whole.

Description.—Hard, heavy, translucent, white masses, having the sharp taste and the pungent odor of ammonia. When exposed to the air it becomes lighter in weight, and leaves opaque, porous and easily crushed lumps, or a white powder. It thus loses both ammonia and carbon dioxide; therefore it should be kept in close containers. For full medicinal value only the translucent masses should be used; for antacid purposes the friable lumps or the powder may be employed. Cold water slowly dissolves it, but hot water decomposes the salt, while alcohol dissolves out the carbamate. *Dose*, 1 to 10 grains.

Specific Indications.—Feeble pulse, pale or dusky surface, cold skin, difficult breathing, shock; respiratory and cardiac collapse; syncope; as a stimulant in low fevers when alcohol is inadmissible (see also *Aqua Ammoniæ*). Broken down constitution, with feeble vitality and acidity of the stomach; cough, with viscid, scanty and difficult expectoration.

Action and Toxicology.—Ammonium carbonate is quickly absorbed and diffused in the blood, probably increasing its fluidity. It is eliminated chiefly by the kidneys, some of it unchanged, some as nitric acid, but most of it as urea. To a lesser degree it passes out by way of the lungs and the skin. It augments the secretions of the kidneys, skin and bronchi. Moderate doses (10 to 15 grains) increase the force and volume of the circulation, with sometimes a sense of fullness and throbbing in the head. In health it is said to slightly elevate the temperature. Ammonium carbonate should not be administered for long periods, for besides neutralizing the acid of the gastric juice and causing diarrhœa and other disturbances, it impairs the blood, lessening its power to absorb oxygen, with symptoms resembling scurvy, and promotes tissue-waste to such a degree as to cause pallor, debility and emaciation.

In small doses ammonium carbonate is an energetic nervous, circulatory and respiratory stimulant, and antispasmodic. In large doses it is a powerful irritant poison, provoking gastro-intestinal inflammation, with pulmonary congestion and œdema. The antidotes for poisoning by it are dilute acids (vinegar, lemon juice, acetic or hydrochloric acids well diluted) with demulcents and protectives to allay the after-effects.

Therapy.—*External.* Ammonium carbonate, in crushed lumps, placed in suitable small bottles and saturated with ammonia water and compound spirit of lavender constitutes "Smelling Salts", a favorite inhalation for debilitated persons who are subject to attacks of fainting, nervous headache, and spasms. Sometimes essence of cloves is added.

Internal. Ammonium carbonate is a decided but fleeting stimulant, diaphoretic and expectorant. In doses of 20 to 30 grains it is emetic. Like water of ammonia it may be exhibited in collapse and shock with failure of heart-action and breathing. It is largely used for the depression following general anæsthesia, particularly in children. To such it may be given in 2 or 3 grain doses in a diluted syrup of acacia, or in milk. In low fevers, with great debility and exhaustive discharges, as in typhoid fever, it may be administered when collapse threatens or supervenes and when alcohol is inadmissible. Used in this state it is invaluable to tide the patient over the stage of depression. It improves the condition of the skin, strengthens the nervous functions, quiets irritability of the brain, and permits the patient to sleep. In fact, it is one of the best of temporary stimulants in prostration from any disease. It is useful in the algid stage of cholera and has cut short attacks of congestive chill. When the circulation is weak and there is cerebral anemia it may be given in insomnia and to good advantage in delirium tremens. The cases to which it is adapted are those in which the delirium is mild but extremely depressing, never violent, and if stimulation of some sort is not forthcoming the patient will die from exhaustion. With bitter tonics and peptics, as nux vomica, hydrastis, and capsicum, it reduces the craving for alcoholics and relieves the gastric

sinking spells of inebriates, so that food can be better tolerated. It is also useful, though less valuable than the solution of ammonium acetate, as a quick sobering agent in acute alcoholism. Many appreciate its worth to control the sour stomach, sick headache, and the depression of spirits following an occasional debauch.

Ammonium carbonate is a valuable antacid. It gives quick relief in acidity of the stomach and headache and other disturbances resulting from such perversion of the gastric fluids. Locke rightly declared that "in broken-down constitutions, with greatly diminished vitality, when an antacid is needed, this is the best known remedy." Five grains are to be given in sweetened water.

Fabulous claims have been made for this salt and for water of ammonia as antidotes to the venom of serpents and reptiles. It probably has no antidotal effect upon the poison, but is useful nevertheless, with alcohol used with judgment, to sustain the heart power and breathing until the depressing effects of the venom shall have been spent.

In the latter stage of pneumonia, ammonium carbonate is valuable to sustain the circulatory and nerve force, and to liquefy viscous pulmonic secretions; and in acute bronchitis and broncho-pneumonia, both in children and old persons it is invaluable as a stimulating expectorant, particularly in the late stages when bronchial dilation is marked and difficult expectoration is experienced, though the tubes are filled with glutinous secretion. By liquefying the latter it renders them easy of disposal. It has a limited use in measles and scarlet fever, when the eruption is tardy or in retrocession, and a sour stomach and low vitality are complications. In the former it sometimes mitigates the cough and favors easier expectoration. Added to infusion or syrup of boneset, hoarhound, spikenard, or elecampane, with fluid extract of licorice it provides good cough medicine for the bronchial irritation and pulmonic catarrh of old age.

Ammonium carbonate has been advised, upon good grounds, as a remedy in cystinuria. It is also a physiological stimulant, opposing the action of overdoses of aconite, veratrum, tobacco, alcohol, and hydrocyanic acid.

For most of the conditions named needing stimulation ammonium carbonate and ammonia water, or the aromatic spirit of ammonia, may be used interchangeably. However, the water of ammonia is best suited to hypodermic or intravenous use, though the carbonate is employed also for the latter purpose. When so used they should be injected remotely, as into the legs, so that they are well distributed in the blood before reaching the heart, as ammonium compounds in concentration have been known to stop the heart instantly when reaching that organ. For antacid purposes the carbonate is to be preferred, though all three preparations have decided antacid properties.

AMMONII CHLORIDUM.

Ammonium Chloride. Muriate of Ammonia. (Crude) Sal Ammoniac. (Formula: NH_4Cl.)

Description.—A slightly hygroscopic granular or crystalline, white, odorless powder, having a cooling, but sharp, salt-like taste. *Dose*, 1 to 10 grains.

Specific Indications.—Dusky redness of the surface, easily effaced but slowly returning; tight tickling cough with scant secretion; viscous tenacious sputum with difficult expectoration; hepatic and gastric torpor.

Action.—Unlike the majority of the ammonium salts the chloride does not appreciably affect breathing or the circulation. At least it has no such stimulating qualities in these directions as is possessed by the carbonate or the water of ammonia. In diseased conditions, however, it notably clears up a dusky skin due to a faulty capillary flow. On the mucous membranes it has a most decided stimulating effect, increasing and liquefying the mucus, particularly of the bronchial surfaces. After absorption the chloride shares the fate of other ammonia compounds. This salt notably increases the liquids and the solids of the urine, especially urea, but not uric acid. While some of it is eliminated in the saliva, the greater portion passes by the renal route. In moderate doses, it may be taken for a considerable period, but finally digestion and nutrition become impaired, with coated tongue, loss of appetite, pain, vomiting, diarrhœa, and emaciation. Very large doses have caused prostration and typhoid conditions, while long continued in such amounts hematuria, epistaxis, petechial spots in the mucosa, and blebs upon the skin have been observed.

Therapy.—*External.* Ammonium chloride is a stimulating discutient. It forms a good basis for liniments when not in itself contraindicated and when a non-greasy embrocation is desired. King used it largely in this manner, incorporating with it any desired medicament. The solution (℥ss to water ℥viij) makes an excellent application for ecchymoses. It acts with remarkable quickness in palpebral ecchymosis, and if applied early will prevent extensive discoloration. It cools and allays itching in rhus poisoning, and relieves the pruritus of prurigo. A saturated solution, hot or cold as desired, forms a good discutient and pain-relieving lotion for inflammatory swellings, rheumatic joints, swollen bursæ, sprains, bruises and contusions. It is less agreeable where the skin is broken or in cuts and wounds, for which there is better treatment. Applied in orchitis and epididymitis it reduces swelling and relieves pain, provided a proper support be given the scrotum. Applied by means of hot compresses it relieves acute wry-neck, hemicrania, and localized neuralgias. When vaporized, by means of heating a small quantity in a metal dish or spoon, or by atomization of its solution, it has been used with good effect in chronic laryngitis and fetid chronic bronchitis.

Internal. Chloride of ammonium is an important remedy in bronchial affections, the exanthemata, and in some gastric and hepatic disorders. The most direct indication is that of capillary stasis accompanying any disorder. The surface circulation is impaired, with dusky redness of the skin from embarrassed blood flow and not from septic conditions. When the duskiness is effaced by drawing the finger across the skin, the pallid streak is slowly replaced by a return of the dark color. As a capillary stimulant sometimes it is very effective in scarlatina, in which it favors the process of eruption and tends to prevent post-scarlatinal dropsy. It acts similarly in measles, and in addition renders the dry cough less distressing.

It is a very important remedy in broncho-pulmonic inflammation both acute and chronic. For the dry, tight, rasping, or the sharp, violent cough with dryness of the throat it is a splendidly effective medicine. In acute bronchitis it may be used to assist in raising overabundant viscous secretions, while in chronic bronchitis it is most valuable to relieve cough by liquefying the tenacious mucus and facilitating its expectoration. It may

be rendered agreeable in these conditions and more acceptable to the stomach by giving it with the fluidextract of licorice or syrup of tolu or of wild cherry. In catarrhal or broncho-pneumonia of children or old persons it is frequently indicated and greatly ameliorates the distressing cough. Small doses relieve reflex cough from gastric and hepatic torpor, with sluggish abdominal circulation. Chronic, rasping, tight cough with but little secretion and precipitated by titillating or tickling sensation in the larynx is promptly relieved by the following: ℞ Ammonium Chloride ʒij, Sanguinarine Nitrate gr. i, Spirit of Lavender Compound fl ʒij, Syrup q. s. fl ʒiv. Mix. Filter through cotton. Sig. One teaspoonful every 3 hours.

Ammonium chloride is useful in chronic gastritis, with pain and hyperacidity, in catarrhal jaundice, in chronic hepatic congestion, and in biliary catarrh. It is also of service sometimes in "biliousness," 30 grains being given in a full glass of hot water. The same solution is said to quickly forestall an attack of delirium tremens; and the salt so given is a well-known treatment for acute alcoholism to quickly sober the patient. It is less effective for this purpose, however, than the solution of acetate of ammonium. Rarely neuralgia is relieved by ammonium chloride, particularly the hepatic and ovarian varieties.

AMMONII IODIDUM.

Ammonium Iodide.—(Formula: $NH_4 I$).

Description.—Very small, colorless crystals or a granular white powder, hygroscopic, having no odor, but a sharp salty taste. Upon exposure to light and air (especially when moist) iodine and ammonia are liberated, the salt becoming yellow or yellowish brown. It is then unfit for medicinal use. It is readily dissolved by water, alcohol, and glycerin. *Dose*, 1 to 10 grains.

Specific Indications.—Localized dull pain in the head, with muscular incoördination, feeble or sluggish circulation, and nervous depression, especially when caused by a syphilitic dyscrasia.

Action and Therapy.—Ammonium iodide acts much like iodide of potassium, but is more stimulating, and like that salt is adapted to the treatment of the secondary and tertiary stages of syphilis and of glandular swellings. Many regard it as particularly useful in the dull headache of syphilis with feeble or sluggish circulation, dizziness, and difficult muscular coördination. The pain is confined to a small area that can be practically covered by the finger tip. It has also relieved pericranial headache associated with feeble circulation and cerebral excitement. Foltz advised its use in syphilitic ear diseases, regarding it as one of the most valuable remedies in suppurative otitis media, with depression.

AMYGDALUS.

The leaves and bark of the twigs of *Amygdalus Persica*, Linné (Nat. Ord. Rosaceæ). Native to Persia. Cultivated everywhere.

Common Name: Peach tree.

Principal Constituents.—The glucosid *amygdalin*, which in the presence of water and emulsin splits into hydrocyanic acid and other bodies. Hydrocyanic acid can be obtained from most parts of the tree.

Preparations.—1. *Infusum Amygdali*, Infusion of Amygdalus. Prepared by saturating the *freshly* scraped inner bark of the twigs (ʒj) in *cold* water (Oj). It must *not* be boiled. *Dose*, 1 fluidrachm to 1 fluidounce.

2. *Specific Medicine Amygdalus.* (Made from the green young twigs and leaves.) *Dose*, 1 to 30 drops.

Specific Indications.—Gastric and abdominal tenderness, with irritation and congestion, and pointed tongue with reddened tip and edges and prominent papillæ, nausea, and vomiting.

Therapy.—Used according to indications as given above, the infusion is a reliable sedative for gastric irritation with vomiting, particularly in children, and in the irritable stomach of phthisis. Scudder valued it in the vomiting of cholera infantum. We believe the failure of many to obtain results from amygdalus in vomiting is due to the use of alcoholic preparations instead of the infusion; and the latter is of no value unless prepared daily from the fresh green inner bark and leaves. We have both succeeded and failed with it according to the cause of the gastric disturbance. It is of less value for cough than wild cherry or hydrocyanic acid. For the latter the infusion or the specific medicine may be used.

AMYLIS NITRIS.

Amyl Nitrite.—(Formula: $C_5 H_{11} NO_3$).

A liquid four-fifths of which is represented by the above formula. It decomposes readily and must be kept from light and air in a cool situation, either in sealed ampules or pearls, or in glass-stoppered bottles.

Description.—A very volatile and inflammable, transparent, yellowish fluid, having an ether-like and fruity odor and a sharp aromatic taste. It mixes with alcohol or ether, but is nearly insoluble in water. Unless carefully preserved, it is an uncertain medicine. *Dose*, 1 to 5 minims (usually 1 to 3) by *inhalation*.

Specific Indications.—Angina pectoris, with high arterial tension; cold, pallid surface; nervous spasms; nervous headache with pallor, and dyspnœa from cardiac disorders, all with high blood-pressure due to vaso-spasm.

Action and Toxicology.—Next to prussic acid, nitrite of amyl is the most rapidly active sedative and nervo-muscular depressant used in medicine. Like all of the nitrites, of which it is the most rapid and most fugacious in action, its most notable effect is great dilation of the blood vessels and rapid lowering of blood pressure. So quickly is the drug absorbed, by inhalation, that these effects occur almost instantly. These results are probably due to a slight depression of the vaso-motor centers and of the peripheral vaso-motor nerves, but most largely to a direct action on the musculature of the vessels, both arterial and venous. The sudden fall of blood pressure, together with cardio-centric inhibition, causes the heart to beat rapidly and tumultuously. While the main action upon the heart is depressant, very small doses are said to stimulate. The sensory tract of the spinal cord is but little affected by moderate doses, but the dominant action is upon the motor side, and in large doses upon the motor nerves and cerebral motor cortex. Temperature is lowered by nitrite of amyl probably through the combined effects of deficient oxidation, impression of the heat-producing and heat-dissipating centers, and the vast vascular relaxation caused by it. It changes the hæmoglobin of the blood into methæmoglobin, and impairs the ozonizing power of that fluid, which it changes from arterial red to a deep-chocolate color. Amyl nitrite is rapidly absorbed and quickly eliminated, chiefly by the lungs and the kidneys, the flow of urine being slightly increased by it according as the blood-pressure in the renal organs is more or less affected. When death occurs from its use it is due to centric respiratory paralysis.

Upon inhaling nitrite of amyl there is experienced flushing of the face, dizziness, rapid beating of the temporal and carotid vessels, throbbing pain and heat in the head, very rapid heart-action, and gasping breathing. There is often a sense of suffocation and the condition appears much like the beginning of asphyxia. The face and membranes are dusky, though there is occasionally marked pallor. Muscular power is completely abolished and the patient sinks helpless. Death is not common from this drug, but one case having been noted, but alarming results are sometimes produced. Recumbent position, systemic emetics (if swallowed), and artificial respiration are indicated, together with rapidly acting stimulants, such as ether and ammonia followed by atropine, strychnine, or digitalis. In order to cause a revulsion of blood to the surface a mustard bath has been advised, with the ice cap applied to the head.

Therapy.—Nitrite of amyl is *the* remedy for extreme arterial tension, except where there is advanced cardiac or cerebral degeneration. It is the best and quickest palliative for angina pectoris, with high blood pressure. Always effective for temporary use, there are those who believe it to favor a final cure, though this cannot reasonably be hoped for. In dyspnœa due to valvular disease of the heart, cardiac hypertrophy, and in heart failure from many causes it relieves by decreasing the arterial obstruction to the heart's action by the general vascular relaxation it causes. In heart failure from fright, or nervousness, or anæsthesia, and in syncope, it may be cautiously inhaled in single whiffs. If it does not relieve at once it should be discontinued, for damage will result from pushing its effects. Hare declares amyl nitrite the best remedy, by inhalation, for hemoptysis. It relieves by the vascular dilatation produced, particularly of the splanchnic circulation, bleeding the patient into his own vessels, and thus partially diverting the flow of blood from the lungs. It should not, however, be pushed too vigorously.

Nitrite of amyl relaxes spasm, both general and local and of both the voluntary and involuntary muscles. It is one of the agents to be used in tetanus and in poisoning by strychnine or nux vomica, being given in the latter during the intervals of repose, on account of the victim's inability to inspire it during the respiratory cramp of the convulsion. In either condition it may also be given hypodermatically. Amyl nitrite will cut short impending attacks of epilepsy when the aura is present. The patient knowing his liability to seizure, and having "the pearls" at hand may crush one and inhale it. It is of little value during attacks, except in those instances of many repeated spasms (*status epilepticus*) when the agent frequently controls the seizures and prevents immediate recurrence. In the cases in which it succeeds there is high arterial pressure. By inhalation this drug is frequently effective in hysteria, hystero-epilepsy, spasmodic asthma, and obstinate hiccough, all with vaso-motor contraction, and sometimes in whooping-cough, infantile convulsions, and laryngismus stridulus. It should be used upon small children only in extreme cases, and then with the greatest of caution. While amyl nitrite is effective in controlling puerperal eclampsia, with high blood pressure, it should not be so used on account of its liability to permit post-partum hemorrhage because of the great relaxation of the uterine musculature caused by it. It re-

lieves after-pains, but the same caution must be observed as with puerperal convulsions. The drug gives temporary relief from neuralgic or spasmodic dysmenorrhœa, in full-blooded women.

Sick headache and migraine, when due to vaso-spasm or to anemia, are relieved by amyl nitrite. It should be employed only when the face is pale, and in moderate doses. For the nausea and headache and other disturbances of the menopause, with cardiac palpitation and flushes of heat followed by perspiration, Locke advised the following: ℞ Amyl Nitrite gtt. xv, Alcohol ℥j. Mix. Sig. Dose 1 to 10 drops on sugar 3 times a day.

Nitrite of amyl is asserted to abort pernicious malarial fever, or congestive chill, if given during the algid stage, and a similar use for it under like conditions has been suggested in Asiatic cholera. It is also reputed effectual to prevent and to cure seasickness. Apparently it is of value in chronic interstitial nephritis to prevent convulsions and to relieve the heart in its efforts to propel the blood against abnormally strong arterial resistance. Its status in chloroform narcosis is not well established. Though it has been successfully used in single whiffs, the preponderance of opinion is that it is an unsafe expedient.

AMYLUM.

The fecula or starch of the seed of *Zea Mays*, Linné (Nat. Ord. Gramineæ). (Formula: $C_6H_{10}O_5$).

Common Name: Corn Starch.

Description.—Irregular, angular, white masses, or a fine, white powder; inodorous, with a slight but characteristic taste. Insoluble in alcohol and cold water. When boiled with 15 parts of water and cooled, it yields a whitish, translucent jelly (starch paste).

Preparation.—*Glyceritum Amyli*, Glycerite of Starch.

Action.—A carbohydrate food contributing to the production of animal-heat, and when consumed in too large quantities for long periods increases fat and gives rise to flatulence and gastric acidity. Under the same conditions it may cause sugar to appear in the urine.

Therapy.—*External.* A valued dusting powder for intertrigo, erysipelas and irritated skin, and as starch-water (diluted starch paste) a useful demulcent for inflammatory disorders of the lower bowel and a medium for rectal medication. The glycerite alone (or as a vehicle for other medicaments) is a bland and non-irritating application to relieve the heat of eczema, erythema, excoriations, and other irritated or inflamed disorders of the skin.

Internal. The antidote for *iodine* poisoning. Diluted starch paste may be used as a lenitive after other forms of irritant poisoning, and as a mucilage for the administration of medicines.

ANEMOPSIS.

The root of *Anemopsis californica*, Hooker (Nat. Ord. Saururaceæ). A native perennial of wet places in Southern California and Northern Mexico. *Dose*, 1 to 60 grains.

Common Names: Yerba mansa; Yerba del mansa.

Principal Constituents.—A heavy aromatic oil (5 per cent) and tannic acid. No alkaloid has been found in it.

Preparation.—*Specific Medicine Anemopsis. Dose*, 10 to 60 drops in syrup.

Action and Therapy.—Reputed astringent, tonic, carminative, and anti-emetic. A mucous membrane stimulant for catarrhal conditions of the respiratory, gastro-intestinal, and genito-urinal tracts. It has given good results in bronchial cough and nasal catarrh. In the latter affection, Munk uses it largely as a spray to the nose and throat, employing from 10 to 30 drops of the specific medicine to slightly glycerinated water. It has a reputation for relieving the excessive discharges of chronic gonorrhœa, acting somewhat like cubeb.

ANISUM.

The dried ripe fruit of *Pimpinella Anisum*, Linné (Nat. Ord. Umbelliferæ). Egypt and Western Asia; cultivated in Southern Europe. *Dose*, 5 to 40 grains.

Common Names: Anise, Aniseed.

Principal Constituents.—A volatile oil (*Oleum Anisi*) composed chiefly (95 per cent) of the stearopten *anethol* ($C_{10}H_{12}O$), which, upon oxidation, yields *anisic acid* ($C_8H_8O_3$)

Preparations.—1. *Oleum Anisi*, Oil of Anise. Derived from Anise (above) or from *Star Anise* (*Illicium verum*, Hooker, Nat. Ord. Magnoliaceæ.). The botanical origin must be stated on the label. Oil of Anise is a highly refractive, colorless or light-yellow liquid, having the taste and odor of anise. It is freely dissolved by alcohol. *Dose*, 1 to 5 drops on sugar.

2. *Infusum Anisi*, Infusion of Anise (Anise, ℥ij or ℥iij; Boiling Water, Oss.). *Dose*, 1 to 2 fluidrachms.

3. *Spiritus Anisi*, Spirit of Anise. Ten per cent Oil of Anise in Alcohol. *Dose*, 1/2 to 1 fluidrachm in hot water.

4. *Aqua Anisi*, Anise Water. *Dose*, ℥j to ℥j.

5. *Specific Medicine Anise*. *Dose*, ℥j in water.

Specific Indication.—Flatulence, with colicky pain.

Action and Therapy.—Anise is an agreeable stimulating carminative employed principally for the relief of nausea, flatulency, and the flatulent colic of infants. Anise imparts its odor to the milk of nursing mothers. It is an ingredient of Paregoric (Camphorated Tincture of Opium), and is largely used to impart to or correct flavor in medicinal preparations, especially cough mixtures. For infants the infusion is the best preparation and it should not be sweetened. The spirit (1/2 to 1 fluidrachm) given in hot water is more agreeable and effective for older children and adults. The oil (1 to 5 drops) on sugar may be used by the latter, if desired.

ANTHEMIS.

The flower-heads of *Anthemis nobilis*, Linné, (Nat. Ord. Compositæ). Collected from cultivated plants.

Common Names: Roman Chamomile, Chamomile, English Chamomile.

Principal Constituents.—A stimulating oil (*Oleum Anthemidis*) and resin; and tannin.

Preparations.—1. *Specific Medicine Anthemis*. *Dose*, 1 to 60 drops.

2. *Oleum Anthemidis*, Oil of Anthemis. *Dose*, 5 to 15 minims (on sugar).

3. *Infusum Anthemidis*, Infusion of Anthemis; (Anthemis, ℥ss; Water, Oj). *Dose*, 1 to 4 fluidounces.

Therapy.—The cold infusion is reputed stomachic; the hot infusion diaphoretic (1 to 2fl℥), and emetic (5 to 12 fl℥); the oil carminative. The cold infusion may be used in gastric debility, with flatus; the hot infusion to relieve colds due to sudden cutaneous chilling, and in dysmenorrhœa to check pain and facilitate the flow. The oil may be employed for a like purpose, and for intestinal cramps and colic due to flatulency. Anthemis is little used.

ANTIPYRINA.

Antipyrine, Phenazone, Phenyldimethylpyrazolon.—(Formula: $C_{11}H_{12}ON_2$).

Description.—A nearly odorless and feebly bitter salt occurring as a white crystalline powder, or in plate-like crystals. It dissolves readily in water, alcohol, or chloroform, and less readily in ether. It should be carefully preserved. *Dose*, 1 to 10 grains (the usual dose is 3 to 5 grains).

Specific Indications.—Pain and spasm; high temperature in surgical and puerperal fevers; migraine.

Action.—Antipyrine is a powerful antipyretic, general analgesic, local anæsthetic, and even in small amounts has antiseptic qualities. It delays fermentation, and in large amounts destroys some germs. On man it is extremely uncertain and erratic in its effects. Even small doses have occasioned alarming symptoms—the chief of which is a peculiar lividity of the countenance, attended with profuse sweating and collapse. It depresses the circulation more or less in all doses; at least it cannot be said ever to stimulate the heart. In medicinal doses it slightly reduces temperature in health, but very powerfully in fevers. This effect is independent of sweating, occurring whether diaphoresis takes place or not, or when it is prevented by atropine and like agents. Reduction of temperature is probably chiefly due to the direct effects of the drug upon the nervous heat-controlling mechanism of the body, most likely decreasing heat-production and stimulating heat-dissipation. Doses short of toxic have, as a rule, little effect upon respiration, nor does any appreciable change in the blood occur. In toxic amounts, however, methæmoglobin appears in the urine, the brain is first stimulated and then depressed, the spinal nerves, both motor and sensory, are paralyzed, and the respiratory centers are first stimulated, then depressed, and finally paralyzed, producing death. Blood pressure is increased by large doses and depressed by lethal quantities. The drug has been detected in the salivary secretion and in human milk; it may, therefore, affect nursing infants. The chief path of elimination is the renal, the drug appearing in the urine within 30 minutes and being wholly eliminated, mostly unchanged, in from 24 to 30 hours. It diminishes the secretion of urine, however, and decreases the output of nitrogenous products of tissue waste. Even in doses regarded medicinal, antipyrine has occasioned coldness, copious sweating, irregular heart action, vomiting, and other signs of depression bordering on collapse.

The usual symptoms from physiological doses (not more than 20 grains) are a languid and uneasy feeling, blueness of lips and finger tips, sometimes cyanotic pallor, dyspnœa, chilliness, cold clammy hands and very cold feet. Profuse general sweating follows. Hysterical phenomena are not uncommon, and there appears a rubeoloid eruption lasting about five days, followed by slight desquamation. The eruption sometimes assumes an erythematous character, or severe urticaria, or dermatitis, with œdema, or watery blebs and bloody blisters may follow its use. Occasional symptoms are: tinnitus and fullness of the head similar to that produced by quinine, convulsions, coryza, burning in mouth and fauces, laryngeal complication, cough, gastro-enteritis, and mental dullness—more rarely vomiting, diarrhœa, stupor, general neuralgic pains, and dysuria.

A lethal dose produces dizziness and tremors, distressing head symptoms, increased pulsation, profuse sweating, cyanosis, marked reduction of temperature, oppressed and stertorous breathing, exaggerated reflexes, somnolence, coma, profound insensibility, pupillary dilatation, convulsions, and death. The latter is due to centric respiratory paralysis.

The treatment of antipyrine poisoning embraces the application of heat, resort to forced respiration, and the administration of stimulants—ether, alcohol, ammonia, and atropine hypodermatically. Inhalation of oxygen may be necessary.

Therapy.—*External.* Antipyrine is a local anæsthetic and antiseptic, and a hemostatic of considerable power. Injected hypodermatically it produces local anæsthesia lasting several days. It is not likely to produce abscess if pure and aseptically employed—but causes at first considerable pain. As a hemostatic it may be used in epistaxis and to control capillary oozing after operations, and as an antiseptic it may be applied to small wounds and to cancerous and other ulcers to relieve pain. Only small quantities should be used and small areas so treated, lest poisonous absorption takes place.

Internal. Antipyrine has been used as an analgesic, nerve sedative, antispasmodic, antipyretic, antigalactagogue, and to restrain secretions from the kidneys and bowels. Its chief value is in its power to control pain and spasm. It markedly reduces temperature in febrile states, but the preponderance of fast-accumulating evidence, even in the old school where it has been most largely used, shows it to be wholly undesirable as an antipyretic. While its power to reduce temperature is undisputed, it is well known that it does not, in the least, shorten the course of any of the febrile disorders, and is open to the serious objection of favoring cardiac depression and collapse, and tends to increase the difficulty upon which many fevers depend in causing the retention in the system of "nitrogenous products of tissue waste," whose elimination is prevented by its restraining power over renal activity.

It does apparent good, however, in surgical fever following operations and in puerperal septicæmia, with intensely high temperature. Here it should be employed to reduce the temperature somewhat, but it must not be carried too far. In the high temperature of respiratory lesions it is said to be of some value, as in pneumonia and pleurisy, but its employment should be discouraged. The special sedatives are much to be preferred. It has no action upon the diseased structure, except to relieve pain and lower temperature. Undoubtedly, the many cases of "heart failure" are due largely to the indiscriminate use of this and other coal-tar derivatives. Antipyrine has been used to control the febrile phenomena of phthisis, but the unpleasant and debilitating sweating produced more than overbalances the good it may do. Neither should its use in thermic fever (congestive form) from sun-stroke be encouraged, as has been advised, and it should never be employed in that from heat exhaustion.

Diarrhœa, diabetes mellitus and insipidus, and other excessive secretions, except of the skin, have been restrained by its use. Epilepsy, purely functional, tetanus, asthma, and other spasmodic disorders, have been treated by it with both success and failure. Chorea and whooping cough,

however, seem to be more amenable to it, and it is accredited with easing the paroxysms and shortening the duration of the latter disease.

Its best field of action is in painful and spasmodic disorders. In migraine and other forms of headache, especially of neuralgic character, it is especially effective. However, much danger attends its constant employment, as prolonged prostration and debility have followed such use. It is unquestionably cumulative. It is used largely to control pain in sciatica, tetanus, dysmenorrhœa, gravel, locomotor ataxia, neuritis, rheumatism (muscular and articular), arthritis (rheumatic), gout, angina pectoris, renal and hepatic colic, syphilis, neuralgia of zoster, and to allay itching and burning pain of cutaneous disorders. Palpebral neuralgia, sclero-choroiditis, episcleritis, iritis, keratitis, irido-choroiditis, pain after cataract operations, toxic amblyopia, and floating bodies in the vitreous humor, are among the eye affections in which it has been used, though it is not looked upon with special favor by our ophthalmologists.

The large doses formerly recommended—75 to 90 grains and subsequently 15 to 50 grains—are never now given. The dose should not, at any time, exceed 15 grains, and 5 grains is about the best dose for average purposes. For young children give 1 grain every hour until 3 doses have been taken. It may be administered in mint water, aromatic syrup, or coffee. Subcutaneously, 5 grains is the safest maximum dose. It has also been given by enema and suppository. Tablets are unsatisfactory as they often fail to disintegrate.

APIS.

The virus of the *Apis mellifera*, Linné, or Common Honey Bee.
Preparation.—*Specific Medicine Apis. Dose*, 1/30 to 5 drops.

Specific Indications.—Constant desire but inability to urinate, the urine being deep-red; vesical and urethral irritation, with scanty secretion of dark red urine; hot, dry, burning, itching or stinging surfaces; itching with burning of the surface, particularly of the urinary passages and genitalia; puffiness, especially of the mucosa, as if stung, with or without a tendency to œdema; hives; faucial and tonsillar inflammation, with marked œdema, the tissues appearing like bags of clear water.

Action and Therapy.—Apis is decidedly diuretic and probably somewhat alterative and diaphoretic. Small doses of it relieve irritation of the urinary tract and this is its most specific effect. Larger doses stimulate the kidneys and cause an increased flow of urine. Even though inflammation exists, the small dose is effectual in allaying irritation. The most direct indications for apis are the hot, dry, burning or itching surfaces, and the constant desire to urinate, the urine being concentrated and of a deep-red color. Under these circumstances it is one of the most certain of diuretics. It may be used both in suppression and retention of urine, from atony. It is very useful for urethral and cystic irritation, both in man and woman, when there is burning or stinging pain, and constant and annoying tenesmus. For that form of cystic irritation, with frequent calls to urinate, experienced by women, from sudden checking of cutaneous secretion, or just after menstruation, it is one of the most valuable of medicines. Sometimes it is greatly aided by eryngium or gelsemium, as indicated. By its power of

relieving renal irritation and engorgement, thereby increasing function, it often aids in relieving in anasarca, ascites, and hydrothorax when the kidneys are not diseased, and the watery accumulations are not due to malignant and other organic changes. Though often a self-limited disorder, apis hastens the removal of post-scarlatinal dropsy, and in both measles and scarlet fever it relieves the urinary irritation and skin discomfort so often present. Occasionally it gives relief in cystitis, and rarely in chronic nephritis, though it does not cure the latter.

Apis is invaluable in œdematous sore throats, and in those in which puffiness apparently involving the submucosa appears. The angina of scarlet fever is sometimes of this type. In that form of rheumatism having the specific indications for apis, it proves a valuable adjuvant to other treatment.

In some skin affections apis is extremely useful. It has no peer in most cases of acute urticaria, when there is much soreness and itching. It relieves swollen œdematous pudenda and vulvar inflammation, while in vesicular erysipelas it is a medicine of prime value. The parts are tensive, burning, or stinging, with lancinating pain and marked dermal irritation. Apis is the most satisfactory agent we have used for the urticaria following the use of antitetanic serum.

Apis has a limited place in gynecological medicine. In simple acute ovarian congestion and inflammation, and sometimes in menstrual irregularities, associated with genital puffiness and pudendal itching, and a sense of fullness and tenseness, apis serves a very useful purpose.

APOCYNUM.

The root of *Apocynum cannabinum*, Linné (Nat. Ord. Apocynaceæ) gathered in autumn after the leaves and fruit have matured. Grows throughout the United States. *Dose*, 1 to 20 grains.

Common Names: Bitter Root, Canadian Hemp, and improperly, Indian Hemp.

Principal Constituents.—A resinous principle—*apocynin*, and a yellow glucoside, *apocynein;* and *apocynamarin*, or *cynoloxin*, or *cymarin*, all of which resemble digitalis glucosides in action.

Preparations.—1. *Specific Medicine Apocynum. Dose*, 1/4 to 20 drops. *Usual form of administration:* ℞ Specific Medicine Apocynum, gtt. x to ʒj; Water, ʒiv; Mix. Sig. One teaspoonful every 1 to 3 hours.

2. *Decoctum Apocyni*, Decoction of Apocynum (root ʒj to Water, Oj). *Dose*, 1 to 2 fluidrachms.

Specific Indications.—Watery infiltration of cellular tissue—œdema—with weak circulation and general debility; skin blanched, full, smooth, and easily indented; puffiness under the eyes; eyelids wrinkled, as if parts had been recently swollen; feet full and œdematous, pitting upon pressure; constipation, with œdema; urine scanty and circulation sluggish; boggy, watery uterus; full relaxed uterus with watery discharge; profuse menorrhagia, too often and too long continued; passive hemorrhages, small in amount and associated with pedal œdema; mitral and tricuspid regurgitation, with rapid and weak heart action, low arterial tension, difficult breathing, cough, and tendency to cyanosis.

Action.—Apocynum acts powerfully upon the heart, slowing its action and raising arterial tension. The cardiac muscle appears to be directly stimulated by it as are probably the arterial coats. Contraction of the renal arteries also takes place, so that while less blood passes at a time

through the kidneys, the act of filtration is more perfect and marked diuresis results. Though long known that diuresis was one of its most prominent results, the knowledge that this is due to the better cardiac pressure and arterial tonus, rather than to the increased intrinsic secreting power of the renal glomeruli, is the result of pharmacologic investigation in recent years, particularly the work of Horatio C. Wood, Jr. The general effects upon man of full doses of apocynum are nausea, and sometimes vomiting and purging, succeeded by copious sweating. The pulse is then depressed, and in some a disposition to drowsiness is observed until relieved by vomiting. The powdered drug causes sneezing. The small doses employed in Eclectic therapeutics seldom occasion any of the above-named symptoms save that of severe watery purging, which may occur suddenly, when the drug has been administered persistently for several weeks.

Therapy.—No remedy in the Eclectic materia medica acts with greater certainty than does apocynum. In former times it was employed in heroic doses chiefly for its hydragogue cathartic and diuretic effects. Early in the last century it was employed by the botanic practitioners for the relief of dropsy. Later the Eclectic school developed its specific uses in dropsy and affections of the heart and circulation. Like many similar drugs, the powder was employed as a sternutatory in the days when it was believed that such effects as the increasing of the nasal discharges was the best way to relieve headaches and certain catarrhal affections. Again, it was recommended in diaphoretic doses, for the relief of intermittent and remittent fevers, and in pneumonic involvements, conditions in which it is now seldom or never thought of. It is rarely employed nowadays as a cathartic, and then only in dropsical conditions, as other hydragogues have been similarly used. Such is the use of it advocated by the authors of the regular school of medicine, by those who use it at all; and from such a use arises the criticisms frequently indulged in in condemnation of the drug. Eclectics do not use it in this manner. Specific medication has established that this action is not necessary, for when specifically indicated it promptly removes effusions without resorting to cathartic doses. Consequently it finds little use as a cathartic, except very rarely as recommended by Goss, for the removal of ascarides.

To use apocynum intelligently and successfully, the prescriber must recognize, first, that debility is the condition in which it exerts its specific and beneficial effects—debility of the heart and circulatory apparatus, of the kidneys, of the capillaries of the skin particularly. In such a state it will prove a remedy; under opposite conditions it is likely to prove an aggravation. The patient with a strong, rope-like, hard, and quick pulse is not the patient for apocynum. On the other hand, the feeble pulse, soft and of little force, indicates its selection as the remedial agent. The atonic state which readily permits of exudation from the blood vessels is the ideal condition which we seek to remedy with apocynum. It is a vascular stimulant. Such results one would not expect to obtain if there were circulatory obstruction or active fever. The only apparent exception, in which it is adapted to active conditions, is that reported by Webster of its efficacy in active inflammation of the upper pharyngeal and post-nasal tract, where, he declares, it rivals phytolacca in its results. One can not expect apocynum

to reconstruct wornout tissues or to restore damaged vascular valves. We must not hope to work miracles with it where there are such structural lesions as incurable or malignant organic diseases of the heart, liver, or kidneys. Yet in these conditions, when debility and subcutaneous, watery exudation are strong factors, it alone is a powerful remedy to relieve urgent symptoms and to put into action that portion of sound tissue that remains. The most we can hope for is an amelioration of the symptoms, and a notable decrease of the watery accumulation may be looked for. Under these circumstances we have removed enormous dropsical swellings with it, giving quick relief from dyspnœa and thereby allowing the patient to obtain rest in the recumbent position. Still it did not cure, and in many such instances death mercifully removes the victim before extensive infiltration can again take place. Digitalis, cactus, strophanthus, and convallaria often aid its action. It is a singular circumstance, mentioned by Krausi, and which we have also observed, that apocynum seldom has any effect upon patients who have been subjected to paracentesis. In our opinion this is due to the advanced stage of the disease, usually reached by the time it is necessary to tap; for tapping is seldom regarded a curative measure, and is resorted to in the later stages of ascites to give temporary relief. It is then too late for any drug to gain a satisfactory foothold. Moreover, apocynum is less effective in ascites than in œdema or anasarca, for the latter is most likely to depend upon circulatory failure, whereas the former may depend most largely upon malignant or obstructing tumors.

The chief indication for apocynum is watery fullness of tissues as if infiltrated and accompanied by debility. This may be shown in the puffy eyelids, the swollen feet and ankles or other parts, which pit upon pressure. The skin is usually blanched, sometimes streaked with pinkish lines, full, smooth, and glistening. If the case be chronic or subacute, the more active the drug appears. With these conditions it may confidently be relied upon to cure curable cases or to give relief in incurable maladies, whether they are revealed in simple œdema or anasarca, ascites, or dropsy of any of the serous cavities, or dropsy following scarlatina or malarial poisoning. In both of the latter conditions it is unusually effective. When such accumulations, functional in origin and due chiefly to vascular weakness, accompany atonic stomach and bowel disorders, as gastric and intestinal dyspepsia, and in syphilis, it is a signally useful drug. In rheumatism, arthritis, and sciatica, with œdema, or even if but slight puffiness of the part be present, it renders valuable aid to antirheumatics or other appropriate remedies. Acute and chronic hydrocephalus, with spreading sutures, protruding fontanelles, and puffy eyelids, have yielded to the curative action of apocynum. It has been recommended in cerebro-spinal meningitis during the stage of effusion. In watery leucorrhœa, passive menorrhagia, irritable and congested uterus, prolapsus uteri, uterine subinvolution, and in some cases of amenorrhœa, in all of which debility is marked and the pelvic tissues are heavy, lax, and sodden, and there is slight infiltration about the ankles, apocynum has cured when remedies ordinarily directed in gynæcological practice have failed to relieve. For the renal congestion of the second stage of tubular nephritis Gere found it to be the best remedy. Others assert its usefulness in the nephritis of pregnancy with albumen in the

urine. Our experience with apocynum leads us to believe it less valuable in dropsies with albumen waste than in those without it but dependent most largely upon circulatory embarrassment.

Apocynum is of very great value in diseases of the heart and circulation —a fact recognized and acted upon in Eclectic therapy years ago. Its action in giving tone to the heart muscle and vessels, and its use in cardiac disorders, was the subject of comment by Scudder, Locke, Ellingwood, Freeman, Waterhouse, Webster, and others. Angina pectoris, attended with œdema, and præcordial oppression of smokers, are relieved by it. Krausi calls attention to its utility in mitral regurgitation, and speaks of it as the king of remedies in tricuspid regurgitation, with rapid and feeble cardiac action, low arterial tension, cough, dyspnœa, pulsating jugulars, general cyanosis, scanty and high-colored urine, and general dropsy. He also refers to it as giving no special aid in aortic diseases.

The observation made by Krausi that apocynum increases secretion and excretion by way of the kidneys, whereas digitalis, after twenty-four hours, causes a retention of urea, is an important one, and should not be lost sight of. This ought to make it a valuable agent in uræmia and conditions depending upon faulty elimination of that body. Within a few years the internal and the hypodermatic use of apocynum directly upon the nerve is said to have promptly relieved sciatic neuritis.

The observations of a single reporter on the use of the first dilution of apocynum in not over one-drop doses every two hours as a remedy for obesity, is worthy of consideration and seems rational as the classic indications are noted. However, one must not be too optimistic concerning the power of a medicine to reduce fat, nor must anasarca be mistaken for obesity. In these cases the pulse lacks strength, though it is rapid; the temperature is inclined to subnormal in the morning and slightly above normal in the evening; the tongue has a dirty-white coating; the appetite is poor, the abdomen full and doughy to the touch; and there are gaseous eructations from the stomach and expulsion of flatus from the bowels. Occasionally there are night-sweats, and the ever-present indication for apocynum, œdema of the extremities, is constant.

APOMORPHINÆ HYDROCHLORIDUM.

Apomorphine hydrochloride.—(Formula: $C_{17}H_{17}NO_2HCl$).

The hydrochloride of an artificial alkaloid prepared from morphine by dehydration.

Description.—Very small, white or grayish-white, shining needle crystals, acquiring a greenish tint upon exposure to light and air, of a feebly bitter taste, no odor, and soluble equally in water and alcohol (about 45), but sparingly soluble in chloroform and ether. It should be kept in small, dark, amber-colored bottles. Only the crystalline form should be used; an amorphous form is said to contain dangerous impurities. Solutions of apomorphine acquiring an emerald-green color (in 100 parts of water) should be rejected; and solutions for use should always be freshly prepared. *Dose*, as expectorant, 1/200 to 1 30 grain; as an emetic (by mouth), 1/20 to 1/8 grain; hypodermatically, 1/12 to 1, 8 grain Children should not be given doses to exceed 1/24 grain.

Specific Indications.—To provoke prompt emesis in the *early* stage of alkaloidal and other forms of acute poisoning.

Action.—A dangerously depressing drug, sometimes producing death in very small doses. The chief effects are pronounced sedation, circulatory depression, dizziness, pallor, cold sweat, and profound collapse, with loss

of consciousness. Usually, however, copious vomiting takes place, and the foregoing symptoms are then relieved. Sometimes, after emesis, dangerous syncope may occur; and rarely deep sleep and faintness may follow if emesis does not result. Stimulants should be given and heat applied in cases of collapse from its use.

Therapy.—This salt was first produced by Matthiessen and Wright in 1869. It is the promptest, and usually indicated, emetic for the *early* stage of alkaloidal and other forms of acute poisoning when the stomach pump is not available, or cannot be employed. As its action is centric it should be used hypodermatically (1/8 gr.), and vomiting usually results almost immediately. In narcotic poisoning, if not used before absorption has taken place, it may fail to produce emesis. When not contraindicated by debility it may be employed to unload the stomach of offending food causing spasm or gastralgia. Emetic doses of it sometimes cut short attacks of hysteria, hystero-epilepsy, hiccough, and relax rigid os uteri; and small doses have been recommended to subdue acute maniacal delirium and delirium tremens and thus produce sleep. It is frequently used also as an expectorant, but on account of its tendency to provoke profuse watery bronchial secretion its selection is inadvisable, except in occasional cases of acute bronchitis and broncho-pneumonia, chronic catarrhal bronchitis, and bronchial asthma, when extreme dryness of the membranes is present. Apomorphine is often effectual to empty the stomach in acute alcoholism, when the subject is robust and there is no evidence of impending circulatory failure or pulmonary œdema. Eclectic physicians rarely employ it except as an emetic in poisoning; and it should never be used upon children (upon whom it acts badly) for any purpose, if other emetics can be made to act. Besides, the Eclectic materia medica is too rich in effective and safe expectorants to risk the employment of an agent so dangerously depressant as apomorphine.

AQUA AMMONIÆ.

Ammonia Water.

An aqueous solution of about 10 per cent of NH_3.

Description.—A colorless, clear liquid, having a strongly alkaline or caustic taste and the characteristic pungent odor of ammonia. It turns litmus paper blue. Readily soluble in water. As Ammonia Water deteriorates, it must be kept in glass-stoppered bottles made of hard, lead-free glass, and in a cool place. *Dose*, 5 to 30 minims, largely diluted.

Specific Indications.—Shock, collapse, and depression, with feeble circulation, dyspnœa and cold, clammy skin; asphyxia from suffocating gases; as a stimulant in poisoning by depressing drugs (see also *Ammonii Carbonas*). Pallor, livid lips, dilated or immobile pupils, and weak circulation; depression from stings and bites of insects and serpents.

Action and Toxicology.—Internally small doses of ammonia water do not sensibly affect the healthy individual, but are prompt in showing their effects in low states of the nervous system. Tension in the head, exhilaration of spirits, increased strength with greater activity of the skin, and functions of the kidney and bronchi, are observed. These effects are not followed by depression. (For other effects of ammonium salts, see *Ammonii Carbonas*.)

Stronger ammonia water applied to the skin occasions heat and burning pain, with redness and vesication. If in large amounts and long applied, a painful and gangrenous ulcer results, difficult to heal. The vapor inhaled, produces sneezing, coughing, burning of the nasal passages and increased lachrymation, and in contact with the eye causes burning pain and conjunctivitis. The inhalation of the gas, if strong and in sufficient quantity, may produce choking, inflammation of the mouth and broncho-pulmonic tract, and quickly causes œdema of the glottis, with death resulting from asphyxia in a very few minutes. If the person is unconscious, the inhalation may cause death by asphyxiation.

When swallowed large doses cauterize the parts over which they pass, and visceral inflammation, with local œdema and destruction of tissue, follows. If œdema of the glottis has not taken place, death may be delayed for several hours. Death may be produced by very moderate amounts, while the swallowing of excessive quantities has been followed by recovery. If the patient survives, convalescence may be tedious and protracted.

The antidotes to ammonia are diluted acids—vinegar, lemon, or orange juice; sour cider, and acetic and hydrochloric acids. If used at once, they prove effective by converting the ammonia into harmless salts. If not used early cauterization will have occurred, and only further action can be stopped by them. Bland oils may retard action by saponification of the ammonia, and milk may retard by diluting the poison and protecting the surfaces. Gastro-enteric symptoms must be met by the usual methods, with lenitives and protectives; and opiates to subdue pain. In poisoning by inhalation, the best antidote is the vapor of hydrochloric acid cautiously inhaled.

Therapy.—*External.* The vapor of ammonia water, inhaled, is commonly employed as a quick-acting stimulant to revive persons from fainting, asphyxia, and sudden collapse from shock and circulatory and respiratory failure. It is also inhaled for the relief of the nervous headache of anemia and debility, palpitation of the heart, and hystero-epileptic attacks. When given by inhalation to unconscious persons great care must be taken not to administer it too freely or too close to the nostrils lest its irritant action produce inflammation and œdema of the upper respiratory tract. Ammonia is of great service in poisoning by depressing drugs. It should be given by inhalation, internally and intravenously, as indicated. By intravenous injection ammonia water has promptly antidoted the toxic effects of hydrocyanic, privy, and illuminating gases, and extreme alcoholic intoxication. The vapor of ammonia cautiously inhaled is the antidote to poisoning by inhalation of bromine.

Ammonia water is rubefacient and may be applied, with local restriction, for derivative effects. It should not be allowed to blister. It forms a useful topical application to stings of bees and wasps and to bites of reptiles, spiders, bed-bugs, fleas, and other insects. The following procedure gives the most relief of any means we know of for the irritating pruritus caused by attacks of the almost invisible summer pests, such as "chiggers," mites, and other tormentors. Strip and prepare for a general bath and plunge beneath the water so as to wet the whole body. Have at hand a solution of 2 or 3 ounces of ammonia water in a quart of warm water.

Quickly sponge the body with this solution and immediately immerse and proceed with the bath. This relieves the distressing itching and irritation and probably kills any of the living insects that can be reached by the treatment. For the lesions where "chiggers" have burrowed, full strength ammonia water touched upon the spot gives relief.

Ammonia water is a component of many stimulating liniments for contusions, swellings, superficial aching, and neuralgic and rheumatic pains. If not actually beneficial to the flesh, its strong odor and the glow produced have at least a strong psychologic value. It is frequently admixed with olive oil, for this use, and sometimes with turpentine, camphor, yolk of egg, and other substances. The area of application of such liniments should not be too closely covered for fear of producing blisters. Nor should they be allowed to come in contact with the scrotum on account of the agonizing pain they cause upon that specialized form of skin.

Internal. In medicinal doses, diluted ammonia is one of the quickest and most satisfactory diffusible cardiac and respiratory stimulants. As such it is largely used in cases of depression, shock, and collapse with threatened failure of the heart-action and breathing. Its effects, however, are very transient, but last long enough to tide the patient over critical periods until more lasting stimulants can be made to act. It may be exhibited in the cardio-respiratory failure following general anæsthesia, in syncope, asphyxia, tendency to spasm from difficult breathing, spasmodic asthma, hysteria, and hystero-epilepsy. As an antacid in sour stomach its action is positive and it similarly helps disorders caused or augmented in severity by such gastric perversion, as sick headache, heart-burn, palpitation of the heart, and spasms. In the collapse and gastric disorders resulting reflexly from the retrocession of cutaneous eruptions it frequently aids by restoring the eruptions and by stimulating the patient generally. Its employment in the depression from poisonous bites is common practice. It should not be injected subcutaneously on account of its tendency to cause abscess. When used intravenously a vein in the leg should be selected so that the heart may not be suddenly stopped by direct contact with the ammonia. For its effects in low fevers and other conditions of depression it may be used for the same indications that prevail when ammonium carbonate is effective. In fact, for most purposes they may be used interchangeably. (See remarks under *Ammonii Carbonas.*)

AQUA HYDROGENII DIOXIDI.

Solution of Hydrogen Dioxide, Solution of Hydrogen Peroxide.—(Formula: H_2O_2).

Description.—An odorless and colorless liquid, having a slightly acidulous taste, and producing a peculiar sensation and froth in the mouth. It should not be heated on account of its tendency to decompose. Age and protracted agitation also cause it to deteriorate. A fresh preparation should always be demanded.

[Concentrated hydrogen dioxide is a colorless and odorless, bitter and astringent liquid, capable of irritating, bleaching and blistering the skin. It mixes with water in all proportions. The above preparation contains about 3 per cent, by weight, of the concentrated dioxide, or the equivalent of 10 volumes of available oxygen.]

Action.—Hydrogen dioxide is a powerful oxidizer yielding oxygen to all oxidizable substances, especially blood, pus, and other body-fluids, giving off its gas so profusely that brisk effervescence or foaming occurs.

This makes it a useful cleansing and deodorizing agent. It is non-poisonous, externally used, and is an antiseptic of fleeting power, as it acts only so long as it is giving off oxygen, an evolution very rapidly accomplished. It probably destroys pus germs. At any rate it is most active in disintegrating pus and it dissolves false membranes. It also softens cerumen. When injected into the system it is dangerous, causing paralysis or death by the formation of emboli. Taken into the stomach it is probably of little action, for it is so readily decomposed that in all probability it is destroyed by the contents of that viscus. That it imparts oxygen to the blood when so administered lacks satisfactory proof. It is decidedly antiputrefactive, checking putrefaction only after it has begun, and is of no use to prevent such changes on account of its instability in contact with tissues. It leaves a film of coagulated albumen after its foaming action, and is therefore of less value in fresh wounds on account of searing over the surface than in old wounds in which it destroys unhealthy secretions. Hydrogen peroxide is a common bleaching agent to "blondine" the hair.

Therapy.—*External.* Hydrogen dioxide is the best and most rapid pus destroyer. It is non-toxic and may be applied freely to open surfaces, either full strength or diluted for this purpose. It should never, however, be forced into or applied to cavities without a large or free outlet, for the enormous distention of liberated gas will force infection into parts beyond the already infected area. It should, therefore, seldom be used in the aural canal, lest pus be forced into the attic and mastoid cells, or in the urethra for fear of spreading infection into the prostate or bladder. Used properly and with possibility of free exit it is a most valuable agent for the one great purpose of destroying and forcing out pus from pus-infected areas. It has no practical value in freshly incurred wounds or injuries, a practice so common among the laity. The fleeting character of its antiseptic action precludes all possibility of its usefulness in such conditions. It can have no other value here than that of forcing out blood and detritus—materials that can be removed better by other means.

For putrid and pus-bathed surfaces and ulcers hydrogen dioxide is distinctly valuable. It is one of the very best cleansing applications both to destroy and remove false membrane. It should be used with a swab or sprayed from a glass-tipped atomizer. Metal tips decompose the dioxide. In ozæna it deodorizes and cleanses, but unless there is free exit for the gas it will cause some discomfort. The mouth should be kept well open while using that no infection be forced into the eustachian passages and the antrum. It should also be used in the nose in small amounts, well diluted, and slowly applied lest frontal sinus and ethmoid infection result. When other agents not possessing this expansile power can be used they should be selected in preference to the dioxide. It is a useful spray for all forms of tonsillitis, infectious sore throat, and the angina of scarlet fever. It cleanses purulent discharges from the eyes, and fetid secretions from the mouth and that arising from fetid bronchitis. As a toilet wash for the mouth it is useful in tuberculosis of the lungs and throat; used in pyorrhea it helps to dislodge and cleanse the pus from the infected dental sockets. If the teeth have cavities or fillings it may cause some pain.

Boils, carbuncles, abscesses, open sinuses (except where extension of infection can be made to reach delicate organs) may be treated with it. It cleanses chancres so that indicated treatment may be more effectual. In gonorrhœa in the female it is very valuable to precede a thorough douching with hot water, after which irrigation with solution of permanganate of potassium may be performed. It is of doubtful safety in gonorrhœa in the male for obvious reasons, and we should hesitate to use it in the bladder or uterus, or in disorders of the ears. The stings of insects are said to be rendered painless by spraying hydrogen dioxide on the lesions.

Fresh powder stains may be removed by the application of this agent, if the powder-pockets be well opened to allow the extrusion of the blackened particles by the expansion caused by the gas. This solution bleaches hair to a light yellow, and is sometimes used to remove morph. It is also said to restrain the excessive growth of hair in hirsuties. Hare declares it is the best agent to soften plaster-of-Paris dressing to allow of easy cutting, and for the painless removal of adhesive plaster, spraying close to the junction of skin and plaster as the latter is being pulled off.

Internal. We can conceive of no conditions under which hydrogen dioxide should be useful as an internal medicine. It is not, however, poisonous when so given, and it has been said to give relief in obstinate vomiting, administering it in small sips at a time. Ellingwood argues in favor of its use in the drinking water for typhoid fever patients, and the employment of it in a 10 per cent hot water enema occasionally to wash out the bowels. Under these conditions we would fear distention of the bowels with possible rupture of the ulcerated portions of the intestines. He also advises it in disorders of children, with fetid diarrhœa, bad breath, or tympanites.

AQUA ROSÆ.

Rose Water.

Stronger Rose Water mixed with an equal part of distilled water, immediately before dispensing.

Description.—A clear aqueous preparation having the pleasant odor of roses. [Stronger Rose Water is a saturated, aqueous distillate from the flowers of the hundred-leaved rose (*Rosa centifolia*, Linné, Nat. Ord. Rosaceæ). It is colorless and should have only the odor and taste of fresh rose petals.]

Action and Therapy.—*External.* A cooling, non-irritating and slightly astringent collyrium. As a perfume preparation it is of much value in cosmetic lotions and washes, and the Stronger Rose Water (Aqua Rosæ Fortior) is an ingredient of *Ointment of Rose Water* (*Unguentum Aquæ Rosæ*), or so-called *Cold Cream*. Equal parts of Rose Water and Glycerin is a favorite perfumed lotion for chapped hands, lips, and face.

ARALIA.

The bark of the root of *Aralia hispida*, Linné (Nat. Ord. Araliaceæ). A perennial undershrub of the eastern section of the United States. *Dose*, 1 to 30 grains.

Common Names: Dwarf Elder, Wild Elder, Bristle-stem Sarsaparilla.

Preparations.—1. *Specific Medicine Aralia. Dose*, 1 to 30 drops.

2. *Decoctum Araliæ*, Decoction of Aralia (℥ss to water, Oj). *Dose*, 2 to 4 fluidounces.

Specific Indications.—Anasarca and œdema, with constipation.

Action and Therapy.—Sometimes a surprisingly effective agent for the removal of anasarca dependent chiefly upon renal inactivity or renal

irritation. Moreover, it often fails. It is, however, useful as a mild renal stimulant and laxative, and occasionally gives a good account of itself in the treatment of gravel.

ARALIA RACEMOSA.

The root of *Aralia racemosa*, Linné (Nat. Ord. Araliaceæ). Found in rich woodlands and rocky situations in the eastern half of the United States.

Common Names: Spikenard, American Spikenard, Spignet, Pettymorrel.

Principal Constituents.—Resin and a trace of an aromatic volatile oil.

Preparation.—*Specific Medicine Spikenard. Dose*, 5 to 40 drops in syrup or water.

Specific Indications.—Irritative cough of debility with excessive secretion.

Action and Therapy.—A pleasant aromatic stimulating expectorant for chronic pulmonic affections, with cough from marked irritation and excessive catarrhal secretions. The syrup is a really valuable cough remedy in greatly debilitated subjects. When used in very small amounts the specific medicine is an agreeable flavor for syrupy cough mixtures. A number of apocryphal uses have been recorded for it, but outside of its good effects upon the respiratory and renal mucosa it has nothing to commend it.

ARGENTI NITRAS.

Silver Nitrate.—(Formula: $Ag.NO_3$).

Description.—Transparent colorless crystals, odorless but having a bitter, caustic and metallic taste. If in contact with organic material, or the crystals are exposed to light, they deepen to gray or grayish-black in color. Readily soluble in water, less so in alcohol, and scarcely in ether. *Dose*, 1/20 to 1/4 grain. Seldom employed internally in Eclectic practice.

Preparation.—*Argenti Nitras Fusus*, Moulded Silver Nitrate. Fused Nitrate of Silver. Lunar Caustic. White cones or pencils, otherwise possessing the characteristics of silver nitrate, of which they contain about 95 per cent. Used as a cauterant.

Action and Toxicology.—Applied to the tissues silver nitrate precipitates albumen and coagulates fibrin, an albuminate of silver being formed. This leaves a filmy white pellicle, which upon exposure to light becomes dark and quickly dries. Its application causes intense smarting or burning pain. Ulceration and sloughing may follow its use as a caustic, but the mitigated stick and the solutions are very superficial in action, penetration being limited by the deposited albuminate. Silver salts turn the tissues dark or black, which stains may be permanent if their applications are often repeated. The internal effects of silver salts, after absorption, upon the nervous system, circulation, respiration, and other vital processes are not well determined.

When swallowed, pain, burning, and vomiting, and other distressing symptoms of an irritant poison are experienced. The vomitus is dark colored, or turns dark upon exposure to light. The lips and membranes, at first whitish, rapidly turn black. There may be cold, clammy sweat, feeble pulse, anæsthesia, unconsciousness, loss of muscular power, and convulsions. Death takes place either from gastro-enteritis or from respiratory paralysis of centric origin.

The chemical antidote for poisoning by silver salts is chloride of sodium or common salt. It forms an insoluble chloride of silver. The stomach-pump may be used, or an emetic if it will act. Heat should be

applied to the body. Opiates may be needed to quiet pain, and demulcents, such as milk, starchwater, and oils, may be given to retard the action of the silver, to protect the membranes and to relieve irritation.

Argyria.—The chief effects from its long continued use, even in small doses, is a peculiar dark shade of the conjunctivæ, and a dark line upon the gums, followed by a dingy slate-colored discoloration of the skin, giving a peculiar cadaverous appearance. This condition, known as *argyria*, is permanent, and though iodide of potassium and other agents have been used for its removal, little success has attended such efforts. This phenomenon is produced by the deposition of metallic silver, or some of its organic salts, in the pigmentary layer of the skin. The deposit takes place in every tissue of the body except the epidermis.

Therapy.—*External.* Silver nitrate is a superficial escharotic, and in solution sedative and astringent. It is one of the few metallic astringents that may be applied no matter how great the inflammation. As an escharotic it should be employed only for superficial destruction. For deep cauterization it has no value; nor should it be applied in deep wounds, narrow cavities, or sinuses. It is no longer used as a delimiting agent in erysipelas and is less valuable as an application than tincture of chloride of iron.

In full strength, or as moulded nitrate, or in strong solutions, it may be used to destroy warts, fungous granulations, and upon spongy gums, chancres, sluggish ulcers, canker sores, fissures of the tongue and lips, septal ulcers, mucous patches, and to cauterize uterine ulceration and erosion, with free discharge and boggy tissues. Applied to the punctured pustules it is said to prevent pitting in small-pox.

By encircling boils with it and touching the crown of the lesions it may abort the furuncles, especially of the eyelids and aural canal. A strong solution (25 per cent) is said to abort felons, orchitis, and epididymitis.

A 4 or 5 per cent solution may relieve itching of the vulva and anus. A 25 per cent solution or the moulded caustic may be used to cauterize and stimulate healing in rectal fissure. Strong solutions are less painful than weak ones. A reddened surface with threatened bed sores may be treated with a 2 to 4 per cent solution with the probability of preventing erosion.

Silver salts are fatal to the gonococcus. A weak solution (2 to 4 per cent) may be used as a douche in gonorrhœa of the female, after first swabbing the vaginal walls with a solution of similar strength. It is also used as an initial injection for gonorrhœa in the male. If it does not help at once, it usually aggravates the discharge. Organic silver salts—protargol, argyrol, silvol, etc., and similar semi-proprietary preparations—have largely supplanted the nitrate for this purpose though they are less energetic.

Silver nitrate in 1 per cent solution is instilled into the eyes of the newborn to prevent ophthalmia neonatorum, and a 2 per cent solution after infection has taken place. This prophylactic precaution (practically Crede's method) of the use of silver or similar salts in the eyes of the newborn is now required by law in many States of the Union. Weak solutions of silver nitrate are very useful in purulent conjunctivitis and constitute the best treatment for gonorrhœal ophthalmia. In trachoma a 25 per cent

solution may be painted upon the granulations and its excessive action checked by a solution of common salt. Silver salts should not be used in the eye unless the cornea is intact, for fear of producing a permanent corneal opacity as a result of the deposition of silver.

In 1/4 to 4 per cent solution silver nitrate is reputed effective in catarrhal and chronic suppurative otorrhea. It should not be dropped in the ear, but used by means of a suitable applicator. Neither should the use of the stick be attempted in the ear lest it break and a portion become lost in the middle ear. The salt may, however, be fused upon a platinum wire and thus used to lightly touch the edges of a perforation of the drum membrane. It usually causes prompt healing and closure. Aural polypi may be removed by silver nitrate.

In certain skin diseases silver nitrate may be used very effectively to control itching and destroy parasitic organisms. It has been employed successfully in various types of tinea, in prurigo, lichen, psoriasis, chronic eczema, eczema of the external auditory canal, and pemphigus, employing solutions ranging from 2 to 4 per cent in strength. Itching of the aural canal is relieved by weak solutions of it.

The use of a weak wash of silver nitrate has been advised in acute and chronic pharyngitis and other inflammations of the throat and fauces. The practice has little to commend it, and many other agents are safer and more effectual.

In all instances in which it is proposed to employ strong silver nitrate solutions a solution of common salt should be at hand to limit or check its action at once when desired. Fresh stains of nitrate of silver may be removed from garments by first treating them with tincture of iodine and dissolving out the compound so formed with solution of sodium hyposulphite. Cyanide of potassium or mercuric chloride will also remove silver stains, but they are dangerously poisonous to handle.

Internal. In Eclectic practice the internal employment of silver nitrate is believed to be seldom justified; and then only when it will accomplish results that other medicines fail to achieve. It should never be given for long periods under any circumstances, nor should it be considered in nervous affections. Probably of all conditions in which it does good, gastric ulcer is chief. It may also be administered temporarily in hyperchlorhydria and chronic catarrh of the stomach accompanied by sour eructations and vomiting after partaking of food. It is, without doubt, effective in chronic intestinal ulceration. When desired to affect the bowels it must be given in a keratin-coated pill so that it will not be liberated until the alkaline secretions of the intestines dissolve the coating. In chronic dysentery, with ulceration, intense tormina and tenesmus, and pinkish mucoid or blood-streaked evacuations it may be used when other agents fail; and in the chronic diarrhœa of intestinal ulceration with pinkish or blood-stained discharges. The doses should be from 1/12 to 1/8 grain. In rare instances it relieves the prolonged irritation of unyielding cases of cholera infantum, and assists the recuperative powers of the membranes when feeble. The dose should range from the 1/100 to 1/30 grain for this purpose.

Substitutes for Silver Nitrate.

The following substitutes are in common use. None are as active as silver nitrate, but are safer and pleasanter in effect.

Argyrol.—A proprietary proteid silver salt (silver vitellin), containing 30 per cent of metallic silver. It occurs in black hygroscopic scales, freely soluble in water and forming a dark solution which stains fabrics brown or black. Corrosive sublimate in solution (1 to 500) removes the stain. Argyrol is a non-irritating antiseptic, disinfectant, germicide and antipruritic of less force, however, than silver nitrate, for which it is used as a substitute in eye, throat, urethral and vaginal disorders. It is especially advised as an injection in gonorrhœa (5 to 15 per cent solution), and in cystitis (10 to 25 per cent); as an instillation in ophthalmia neonatorum and other purulent ophthalmias (25 per cent) and as a topical application in pruritus vulvæ et ani (20 per cent).

Silvol, a practically non-toxic proprietary compound of silver, closely related to argyrol, occurring as lustrous black granules, slightly hygroscopic, and freely soluble in water. Solutions from 2 to 50 per cent are used for exactly the same purposes as argyrol, to supplant the need for silver nitrate. Sometimes used in ointment, though it is insoluble in oils and fats.

Protargol is also a proprietary proteid silver compound, representing about 8 per cent of metallic silver. It is a yellow powder readily soluble in water. Employed for the same purposes as argyrol and silvol, and in about the same per cent solutions.

ARISÆMA.

The fresh corm of *Arisæma triphyllum*, Torrey (Nat. Ord. Araceæ). Common in damp woods and wet situations in North and South America.

Common Names: Indian Turnip, Jack-in-the-Pulpit, Dragon Root.

Principal Constituents.—Starch, potassium and calcium salts, particularly raphides of calcium oxalate and possibly another acid principle.

Preparation.—*Tinctura Arisæmæ*, Tincture of Arisæma (Corm, ℥viij; Dilute Alcohol, Oj). *Dose*, 1 to 5 drops. Only the tincture of the fresh corm is of any value.

Action.—The fresh corm has no effect upon the unbroken skin. When bitten or chewed it is fiercely irritant, causing a persistent and intensely acrid impression on the tongue, lips, and fauces, something like that of a severe scald, with considerable pricking. Slight inflammation and tenderness may follow. This effect is thought to be due to the raphides of calcium oxalate present. Milk mitigates the distressing sensation.

Therapy.—Arisæma has been recommended for a variety of disorders, chiefly of the respiratory tract, and as a stimulant in low forms of fever, when delirium is marked and the membranes are inflamed and the tongue red, painful and swollen. It is seldom used for these purposes. It is, however, of real value in severe forms of sore throat, intensely painful, swollen and fetid, with deep or purplish-red membranes similar to that of the angina of scarlet fever. It is also useful in chronic laryngitis aggravated by singing or public speaking, and accompanied by hoarseness and loss of voice, burning and sense of constriction in the throat, and thin ichorous discharge from the nose. A strong tincture of the *fresh* corm may be given in drop doses every half to one hour, and a throat wash of one drachm of the tincture to a half glass of water may be used freely.

ARNICA.

The dried flower-heads of *Arnica montana*, Linné (Nat. Ord. Compositæ). A perennial of Siberia and the cooler parts of Europe; also found in Northwestern United States. *Dose*, 1 to 10 grains.

Common Names: Arnica, Leopard's Bane.

Principal Constituents.—*Arnicine* ($C_{12}H_{12}O_3$), a golden-yellow body, a volatile oil, and angelic and formic acids.

Preparations.—1. *Specific Medicine Arnica*. *Dose*, 1/4 to 10 drops.
2. *Tinctura Arnicæ*, Tincture of Arnica. Locally.

Specific Indications.—"Muscular soreness and pain from strain or overexertion; advanced stage of disease, with marked enfeeblement, weak circulation, and impaired spinal innervation; embarrassed respiration; lack of control over urine and feces; sleeplessness from impeded respiration; and dull præcordial pain from 'heart strain'; muscular pain and soreness when the limbs are moved; tensive backache, as if bruised or strained; cystitis, with bruised feeling in bladder, as from a fall or blow; headache, with tensive, bruised feeling and pain on movement; hematuria, with dull, aching, lumbar pain; or from overexertion. Debility with enfeebled circulation." (*American Dispensatory.*)

Action.—Arnica is a decided irritant to the skin, under some circumstances producing marked dermal irritation, deepening into an erysipelatous or acute eczematous inflammation, with pustules and blisters, and often grave constitutional symptoms. In this respect the alcoholic preparations of the flowers are most active, and for this reason full strength preparations should not be used upon the skin, nor as a rule should any preparation of arnica be used upon cuts or injuries causing a breaking of the skin. Under the latter conditions dangerous inflammation, with vesication, has occurred. Persons of sensitive skin, and it is said gouty subjects, are most susceptible to this untoward action of the drug.

Medicinal doses of arnica slow the heart, slightly raise arterial pressure, and stimulate the vagi. Poisonous doses operate reversely and paralyze the vagal centers. Intermediate but large doses produce heat in the throat, nausea and vomiting, dyspnœa, headache, lowering of temperature, and sometimes convulsive movements. With toxic doses these effects deepen into unconsciousness, motor, sensory and vagal paralysis, coma, and death. Death is said to have been caused by two ounces of tincture of arnica.

Therapy.—*External.* Arnica, in tincture or fomentation, has long been a popular but by no means safe discutient to prevent and discuss inflammatory swellings, and to relieve the soreness of myalgia and the effects of sprains, bruises, and contusions. It is often serviceable to remove ecchymoses, and it gives grateful relief to sore muscles that have undergone much strain and exertion. A glycerite has been effectually used upon bites of mosquitoes and other insects. Preparations of the root are less liable to excite dermatitis, and the infusion of the flowers is less irritant than the tincture. After applying the latter, which should always be well diluted, the surface should not be covered or bandaged, so that evaporation may take place freely.

Internal. Arnica is a greatly unappreciated medicine. It has a pronounced action upon the medulla and spinal cord which can be invoked to good advantage in states of depression. The keynote for arnica is spinal and vagal enervation. It should be brought into service when there is deficient nervous response, sluggish vascular power, and in almost all conditions in which prevails the triad—torpor, debility, and depressed function. In the advanced stages of exhausting diseases, where spinal innervation is poor, control over the sphincters lost, and there is feeble respiration due to central vagal impairment, it is a most important stimulant. It should be used when breathing can be carried on chiefly only by force of the will, and becomes weak and shallow when the patient drops into

sleep; or when the sleeper awakens with a start on account of dyspnœa when automatic respiratory action alone is depended upon. Such a state occurs in the low stage of typhoid and other fevers, and in lobar pneumonia. In such conditions arnica is most useful and compares well with strychnine or atropine, or phosphorus, none of which are so safe as arnica. Arnica will prove useful in the depression occasioned by extreme forms of diarrhœa and dysentery when the discharges escape control. In so-called typhoid pneumonia—which is but pneumonia with typhoid conditions—marked asthenia, feeble circulation, great depression, low muttering delirium, picking at the bed clothes, and dry tongue loaded with foul mucus and sordes, it is a most valuable auxiliary to other treatment. In the hectic fever of phthisis, with exhausting diarrhœa and excessive sweating, it often proves the needed stimulant and antihydrotic.

Arnica is a stimulant of great power in anemia, with weak heart and capillary feebleness, and marked depression, diarrhœa and drospy, but no inflammation. During mild forms of so-called chronic rheumatism, with cold skin and general debility it will stimulate the nervous system, restore normal warmth, re-establish restrained secretion, and thus relieve pain. In painful, bruised or subacute inflammatory disorders arising from injury, with marked lowering of nerve tone, muscular aching and chilly sensations, arnica is a remedy of power to give comfort and hasten resolution. When myalgia is caused by exposure, or when muscular soreness and pain are due to strain, overexertion, or sudden jars or blows, the administration of arnica internally, in small doses of the specific medicine preferably, and the diluted tincture applied locally are among the most serviceable of measures.

Arnica frequently relieves "heart-strain" due to exertion, overwork, or from long marching. It also benefits in the heart debility that follows severe strain, worry, or excitement. Dull aching pain in the præcordia, due to lifting or when working against vibrating machinery, as in shoe making, is dissipated by small doses of arnica. For lame back, backache and feelings of soreness and debility of the back, when accompanied by nervous depression and poor circulation, arnica is one of the most direct of remedies. Lumbago, when due to muscular strain or falls, is relieved by arnica. Its action is increased by rhus, macrotys, or sometimes gelsemium. When dependent upon a loaded bowel, venous relaxation in the hemorrhoidal circulation, piles, fissures, sagging of the abdominal contents, pelvic weakness, or a neuritic state of the lumbar plexus, arnica is of little or no value. Indeed, in some of these conditions it may only result in an aggravation of the nervous unrest so frequently attendant upon lumbago, and allied painful disorders.

We have used arnica most successfully in paraplegia and hemiplegia after all evidence of acute inflammation or recent injury has passed. It is especially to be remembered in sphincteral paralyses, so common after long illness in which spinal enervation has played an important rôle. Nervous headache of depression and debility frequently is relieved by arnica, and some believe it to be the best agent for amaurosis, a rather ill-defined ocular disturbance.

Should the patient to whom arnica is administered appear to become nervously excited and restless, or show gastric irritability, its use should be discontinued.

ARSENI TRIOXIDUM.

Arsenic Trioxide, Arsenic, White Arsenic, Arsenous Acid, Arsenous Oxide.
A compound that should contain nearly 100 per cent of pure arsenous trioxide (As_2O_3).

Description.—A white opaque powder; or in glass-like, transparent and colorless masses, or in porcelain-like opaque masses, or in pieces, glass-like, coated with an opaque crust. The glassy form gradually becomes opaque when exposed to moist air. Odorless, soluble in water, glycerin, and sparingly soluble in alcohol and ether. *Dose*, 1/15 grain to 1/100 grain.

Preparations.—1. *Liquor Potassii Arsenitis*, Solution of Potassium Arsenite, Fowler's Solution. (Contains 1 per cent of arsenic trioxide.) *Dose*, 1 to 5 minims (usual dose, 1 minim.)

2. *Liquor Arseni et Hydrargyri Iodidi*, Solution of Arsenous and Mercuric Iodide, Donovan's Solution. (Contains 1 per cent *each* of arsenous iodide and mercuric iodide.) *Dose*, 1 to 3 minims. (Usual dose, 1 minim).

3. *Liquor Sodii Arsenatis*, Solution of Sodium Arsenate (a substitute for Pearson's Solution; contains 1 per cent of dried sodium arsenate). *Dose*, 1 to 5 minims (usual dose, 1 minim).

4. *Liquor Acidi Arseniosi*, Solution of Arsenous Acid. (Contains 1 per cent of arsenic trioxide.) *Dose*, 1 to 5 minims.

Specific Indications.—Dull, muddy or sallow or pallid, inelastic skin; irregular periodicity in malarial cachexia; caseous and tubercular deposits; scaly, vesicular, or tubercular skin diseases; pale and expressionless tongue (sometimes long, dry, and pointed); flabby muscles, and cold extremities; general lack of nerve force, with soft and easily compressed pulse, and impaired sympathetic innervation; imperfect nutrition, with glandular deposits; imperfect nutrition and skin diseases dependent thereon; degeneration of tissue; and malaria failing to respond to quinine

Action.—Applied to the unbroken skin arsenic has very little effect, and only when long or frequently in contact does it produce redness and various eruptions. If, however, the epidermis be removed, or an abrasion, wound, or sore is present it acts as a powerful escharotic. From any absorbable part it is readily absorbed and passes quickly through the blood and lymph to every part of the body. No matter how absorbed in any considerable amounts, its first effect is to produce a violent gastro-enteritis. It is eliminated by all the secretions and excretions, but chiefly by the bowels and the kidneys. When not in toxic amounts it is held in storage in the liver, muscles, bones, and even the brain. From there it gradually passes into the general circulation again, finally to be eliminated chiefly in the urine, and to a lesser extent in the bile, sweat, milk, and feces. It may take months to wholly free the tissues of it.

In very small amounts arsenic probably stimulates the heart, in larger amounts it depresses that organ, and through vaso-motor action lowers arterial pressure and causes extreme dilatation of the capillaries, especially of the splanchnic area. It even paralyzes the latter, and by some its poisonous effects are thought to be due to this action, causing œdema, ecchymosis, the shedding of shreds of epithelium, and a profuse choleraic or "rice water" diarrhœa. Indeed, without a history of arsenic poisoning or its use as a medicine, it is extremely difficult, except by chemical investigation, to distinguish some cases of arsenical poisoning from Asiatic cholera. The action of arsenic on the blood of man and the nervous system is not well understood. In small doses it probably stimulates blood-making, and upon the nervous system a large dose produces paralysis by its effects the upon nerve-

centers, the nerves and the muscles. In small doses it stimulates respiration, but in large doses is a respiratory paralyzant. In small amounts it checks tissue-waste and decreases nitrogenous elimination, while large and toxic doses reverse these processes.

Arsenic is a poison to all forms of life. As it acts most powerfully upon the higher organisms it is of little practical germicidal value. Animal tissues are almost indefinitely preserved by it, and it has been largely used to preserve cadavers and anatomical specimens. In minute doses it may be taken for a prolonged period without apparent ill results. Moreover, toleration for it can be established. In such doses it accelerates the circulation and is tonic to the nervous system. It enables one to take active exercise with but little fatigue and without materially interfering with respiratory action. Certain arsenic eaters among the Styrians become habituated to its use, the maidens to clarify their complexion and enhance their charms, and the men to increase respiratory power, endurance, and virility. These arsenic eaters have been known to consume as much as 4 to 10 grains daily, an amount sufficient to kill several persons unaccustomed to the drug. They are careful, however, not to drink water for some time after taking it.

The first active symptoms occurring from small doses sufficient to be subjectively appreciated are those of gastro-intestinal irritation—anorexia, nausea, abdominal distress, diarrhœa, and sometimes headache. When a constitutional effect is obtained there will be a puffiness or slight œdema of the eyelids, mostly observed after sleep, and which, if the use of the drug be persisted in, results in more pronounced œdema and even a widespread anasarca. These are near toxic effects and constitute a warning to cease arsenic medication. Indeed, its use should never be continued after the puffiness about the eyes is observed.

Toxicology.—In large doses, arsenic is one of the most violent of poisons, producing in overdoses, nausea, vomiting, burning pain of the throat and stomach, soon extending over the whole of the abdomen. Although under certain circumstances a large amount of arsenic has been swallowed without any serious effects, yet as a general rule it is considered that death may be produced by 1 or 2 grains of it taken at a dose. A larger quantity may cause vomiting so quickly as to expel it from the stomach before its deleterious action fairly commences; and a distention of the stomach with food has prevented it from proving fatal. When emesis is caused by its poisonous action, the matters vomited may be bilious or tinged with blood; occasionally there will be no pain or vomiting. There is very apt to be a sense of heat, dryness, and constriction of the throat, with incessant thirst and great difficulty of swallowing. When the bowels are inflamed the abdomen is tense and hard, with loose, bloody stools, tenesmus, heat, and excoriation of the anus. The urine may be diminished or suppressed; pulse quick, small, feeble, and irregular; heart beating irregularly with palpitation; breathing laborious and often painful; tongue dry and furred; frequently with tremblings, cramps, and delirium previous to death; occasionally dark spots or an eruption on the surface will be present. The symptoms are by no means uniform, and will vary with different individuals; there may be faintness, or actual syncope, convulsions, paralysis, great

prostration, coma, etc. In some cases death may ensue without any severe or well-marked symptoms. A peculiarity of some of the apparently mild cases is a "remission" of symptoms after a day or two, leading to false security and snap prognosis, only to be followed by a recrudescence of symptoms and death after six or seven days.

In poisoning by arsenic empty the stomach as quickly as possible by means of lavage or the stomach-pump and the non-depressing emetics—preferably zinc sulphate or mustard, and hasten the action by tickling the throat and fauces with a feather or the finger. Lobelia or ipecac should not be used as they are too slow and favor absorption of the poison by occasioning prolonged nausea. The best antidote is the *freshly* precipitated ferric hydroxide, given freely and repeatedly in tablespoonful doses. The stomach should be repeatedly washed out while this preparation is being given. In case it cannot be obtained quickly the physician should prepare it as follows: Take any quantity of tincture of chloride of iron, or of Monsel's Solution in any quantity of water and precipitate it with ammonia water until a slight odor of ammonia can be smelled upon a wooden spatula or stick. Quickly filter with plenty of water, through a cloth or towel, and administer the brown magma freely. Oxide of magnesia is also an antidote, or it may be used as the precipitant in preparing the foregoing magma, *which must always be made fresh.* The *Ferri Hydroxidum Cum Magnesii Oxido* is equally efficient and lacks the irritating presence of ammonia. It is prepared by precipitating solution of ferric sulphate by magnesia, and is the official antidote to arsenic. Heat must be applied, friction used, demulcent drinks given and opiates to relieve pain. Collapse should be treated by hypodermatics of ether and brandy; and large draughts of water given to flush the kidneys. Castor oil should be administered if there is evidence of the poison having reached the intestinal canal.

Chronic Poisoning. This may occur as the result of acute poisoning insufficient to produce death, and in those who work where they are exposed to arsenical pigments. When arsenic is taken in small doses, continued for a long period, but acting as a slow poison, "there will be a gradual sinking of the powers of life, without any violent symptom; a nameless feeling of illness, failure of the strength, an aversion to food and drink, and all the other enjoyments of life." Among the many symptoms which have been observed in such cases, the following are the principal: flatulence, heat or pain in the stomach and bowels, loss of appetite, thirst, nausea, vomiting, purging, or a looseness of the bowels, with griping; the tongue furred, mouth and throat dry and constricted, and sometimes salivation. The pulse will be quick, small, and often irregular; a dry cough, with oppressed respiration; wasting of the body; very irritable stomach, immediately rejecting anything taken into it. Headache, giddiness, wakefulness; irritation of the conjunctiva, the patient frequently complaining of a feeling like a hair or cobweb in the eye, with redness, swelling or pricking of this organ; the limbs painful, feeble, trembling, subject to numb sensations, cramps, or convulsions. An eruption on the surface (herpes common), falling off of the hair and nails; swelling of the face and feet, and gradual sinking of the patient, with consciousness perfect to the last, or perhaps coma, or delirium. Myelitis, arsenical polyneuritis, and arsenical paralysis, lasting long but

eventuating in recovery, may result from chronic arsenical poisoning. Chronic poisoning by arsenic, in the absence of a history of the case, is very difficult of diagnosis. Its treatment consists in the withdrawal of the drug, or the removal of the patient from his work, arsenic antidotes used, and treating the patient as necessity dictates. Convalescence is long and tedious, and frequently interrupted by intercurrent ailments.

Therapy.—*External.* Arsenic has been used for the removal of dermal growths, such as warts, and for onychia maligna and epithelial cancer. Except in rare instances such use should be condemned, as the danger of poisoning by absorption is very great and the process slow and painful. Moreover, in these days of surgical precision it is wholly unnecessary. Arsenic, in the form of various pastes, constitutes the basis of most so-called "cancer cures" exploited by advertising "cancer specialists." Arsenic is commonly employed by dentists to insert into dental cavities for the destruction of the nerve pulp. This it does less by its corrosive action than by the intense inflammation it causes, resulting in slow death of the nerve. This method is painful, often consuming several days, and the arsenic is usually combined with creosote, or carbolic acid and morphine or other pain-obtunding agents. From 1/60 to 1/30 grain is inserted and covered and held in the cavity by a rubber packing.

Internal.—The therapeutic field of arsenic and its solutions is limited, but positive. It is seldom prescribed in Eclectic practice merely as a reconstructive agent unless certain well-defined indications are present. Be it in cachectic conditions, in gastro-intestinal disorders, in diseases of the skin, or in general debility, arsenic is too powerful an agent to be prescribed hit or miss. But when indicated by the specific indications, it is one of the most direct of our specific resources and a potent agent for good. As worked out and now thoroughly verified by clinical experience, arsenic is of value when the skin has a dirty hue and lacks elasticity. When pinched between the fingers, the fold remains for some time without regaining normal smoothness. The natural spring-like action of the healthy skin is lost and the dermal tissues return sluggishly to their normal position when so treated. A low condition of the blood with a tendency to the deposition of cacoplastic material—imperfect albuminoids—caseous and yellow tubercular formations, tissue degeneration, and impaired nutrition are the general states in which it is indicated. It should never be used where there is irritability and erethism of the nerve-centers, particularly of the sympathetic system.

Under the first condition mentioned, arsenic, in the form of arsenous trioxide, or preferably Fowler's Solution, may be confidently administered during attacks of intermittent fever with irregular periodicity and dry and pointed tongue. The best results are obtained when quinine fails, and where the anemia and general cachexia are more pronounced than the febrile disturbance. Chronic agues best express the condition, perhaps, and the intervals between attacks are long and the malarial cycle irregular. The pulse is weak and compressible, the limbs cold, the tongue pale and expressionless (sometimes dry and pointed), the tissues flabby, and the fires of life burning low. Not only does it act well in such cases, but it frequently proves prophylactic to malarial invasions.

In obstinate neuralgias, especially the intermittent neuralgias dependent upon a malarial cachexia, arsenic is a most important agent, relieving when quinine fails, and when pain relievers are inadvisable and would have no specific antimalarial effects. It is most effective in those forms involving the fifth cranial and the intercostal nerves, though, as a rule, it is useful in most idiopathic neuralgias, as such types are invariably born of debility, or anemia, or some state of cachexia. The value of arsenic in chorea dependent upon a malarial taint, or on chlorotic anemia, cannot be gainsaid. Though large doses are advised and sometimes permissible, the smaller doses are preferable, where the specific indications for arsenic are present. Fowler's Solution is the best form of arsenic for choreic incoördination.

Though the action of arsenic upon the blood is not well understood, it is evidently a blood-maker when used in minute doses. It is certainly a powerful vital stimulant and improves nutrition. Therefore, it is employed as a reconstructive in anemia, whether due to malaria, dyspepsia, chlorosis, losses of blood, post-puerperal depression, or great constitutional debility. The nerve forces are always depressed when arsenic is required. It gives the best results of any agent in pernicious anemia, in leucocythemia, splenic leukemia, and pseudo-leukemia (Hodgkin's disease). In all of these conditions it should be given in small doses and promptly discontinued upon the appearance of puffiness of the eyelids; nor should it be administered for long periods lest arsenical polyneuritis be induced.

When sharply indicated, as noted above, arsenic acts favorably in gastro-intestinal disorders. It is one of the most certain remedies in various forms of vomiting. These are chiefly in chronic inebriates, in chronic gastritis, in malarial disorders, and more rarely in the vomiting of pregnancy, and still more frequently in that associated with phthisis. Its value in diarrhœa is well established, the drug being best indicated in attacks immediately provoked by the intake of food. In the vomiting and diarrhœa of cholera infantum it is one of the most certain of medicines. It is to be selected when there is great enfeeblement, with thin and frequent, non-mucoid stools. In atonic diarrhœa, with imperfect digestion, and followed by periods of depression it is distinctly serviceable, as it is also in the serous diarrhœa of bottle-fed infants affected with chronic intestinal catarrh. For most of the gastro-intestinal disorders the following is the best form of administration. ℞ Fowler's Solution, gtt. v to x; water, f℥iv. Mix. Sig. One teaspoonful every 2 or 3 hours.

Arsenic is of unquestionable utility in atonic dyspepsia, in chronic catarrhal duodenitis with jaundice, in chronic gastritis with burning sensations and due to the retrocession of cutaneous eruptions, in semi-chronic dysentery with impaired vitality of the mucosa, and in chronic mucous colitis. In gastric ulcer and schirrus of the stomach it may be given to relieve pain, vomiting, and diarrhœa. There is no question but that it retards the growth of cancer and sarcoma before the ulcerative stage, but it has no curative effect on these growths. When gastric disorders are chronic and of malarial origin and the patient is greatly debilitated, the more effective arsenic seems to prove.

Surprisingly good effects come from the use of arsenic in the pretubercular, especially those phthisically inclined, with depraved secretions and frequently recurring attacks of coughs, colds, coryza, and exacerbations of chronic nasal catarrh. In subjects once called scrofulous, probably near tubercular at least, it promptly benefits when the specific indications are observed. Scudder, Locke, and Howe were strong advocates of arsenic in pulmonary tuberculosis. The latter was partial to veratrum in this affection, considering it and arsenic our two best ameliorating medicines. His favorite prescription, which became largely employed in Eclectic practice, is as follows: ℞ Fowler's Solution, fl℥ss; Syrup of Lactophosphate of Calcium, fl℥vj; Mix. Sig. One teaspoonful 3 times a day every other day.

Arsenic is the most widely used dermatological medicine. Skin diseases have long been treated with it, some to their benefit, others to their detriment. When, however, the specific indications as pointed out are present, or when the skin lesions are associated with an irregular phase of malaria, or when nutrition is imperfect and there are glandular enlargements, or degeneration of tissue, or infiltration with scaliness, then good results may be expected from arsenic medication. It should never be used, however, and in fact is seldom indicated when the skin is acutely inflamed, or when moist eruptions prevail. It is the remedy for dry, and never for weeping skin conditions. The types best benefited are the dry and scaly, the vesicular, the tubercular, and sometimes the pustular forms. Under these restrictions it is variously useful in eczema, impetigo, ichthyosis, elephantiasis, warty excrescences, corns, lupus, pityriasis, lepra, and some forms of prurigo. It is the best agent in lichen planus, and is said to be useful in lichen ruber, a disease seldom seen in this country. For pemphigus it is the most direct remedy, while in psoriasis it first aggravates and then causes a disappearance of the eruption. In the latter disease, however, the tendency to perpetual chronicity, with remissions, during which the disease is in abeyance, must be kept in mind. It is the consensus of opinion, observing the dictum of Duhring, that, as a rule, arsenic is of little value in diseases of the skin located in the deeper cutaneous layers, but rather is to be used in those involving the superficial strata. Many chronic ulcerations, however, yield to arsenic when the specific indications are closely followed. It sometimes relieves the itching of diabetes mellitus, and of pruritus ani et vulvæ.

Arsenic Preparations and Substitutes (See also *Arsphenamine*).

Donovan's Solution is of benefit in secondary syphilis when the tongue is small and unduly red. It may be used in syphilitic ulcerations, skin blemishes, and articular nodosities of syphilitic origin. Syphilitic taint is little influenced by arsenic alone. The *dose* is from 1 to 5 drops.

Quinine Arsenate (2x trit.) 2 or 3 grains four times a day is advised by Webster in chlorosis associated with metrorrhagia and choreic movements, and in the anemia of malarial cachexia. It is also generally accepted as valuable in neuralgias and chorea dependent on miasmatic influence.

Arsenic Bromide has some claims to efficiency in epilepsy and has been advised in diabetes mellitus. Clemen's Solution may be given in doses of 1 to 3 drops, well diluted, after meals.

Copper Arsenite has been largely used in the watery diarrhœas of infants, in cholera infantum, infantile dysentery, and similar affections. It has no special advantage over arsenic in similar disorders. One 1/100 of a grain is added to 4 fluidounces of water, of which doses of a teaspoonful may be given every 2 to 4 hours.

Atoxyl (Sodium Arsanilate—$NH_2\ C_6\ H_4\ OAs\ OH.\ ONa.$) contains somewhere near 30 per cent of metallic arsenic and is rated as about one fortieth as poisonous as Liquor Potassii Arsenitis, or Fowler's Solution. It is a white crystalline powder of a faint saline taste, soluble in 6 parts of water and about 120 parts of alcohol. Atoxyl is reputed a specific for trypanosomiasis, in which it appears to have been more successful than any remedy hitherto employed. It is especially praised for its effects in that form known as "sleeping sickness." Atoxyl, however, does not cure, but greatly alleviates the symptoms. Gradually the parasites which are at first killed by it are followed by others which appear to become immune to it and eventually remain resistant to the treatment. While in the blood the trypanosomes are easily destroyed, those which are harbored in the lymph-glands and in the central nervous system seem beyond its power to reach. From these foci the supply of constantly and increasingly resistant forms becomes freshly supplied to the blood and thus keeps the disease alive. Atoxyl also attacks the spirillium of relapsing fever, and is effectual in African tick fever, and in all stages of syphilis. It has been supplanted in the latter, however, by arsphenamine, both as an antisyphilitic and trypanocide. Atoxyl is dangerously poisonous in one respect—it produces optic nerve atrophy, resulting in permanent blindness, and this is not preventable by stopping the administration of the drug. Hence physicians are discarding it rapidly. Besides, it has occasioned dryness of the throat, dizziness, headache, fever, vomiting, and diarrhœa, colic, nephritis, and paralysis of the lower extremities. These, together with its proneness to cause blindness, are certainly sufficient to cause one to be wary in its use. The purpose in introducing atoxyl was to find an agent destructive to the protoplasm of the parasite without proving dangerous to the protoplasm of the host, but evidently in some respects the effort must be recorded as a failure. We are advised that the proper dose is that which destroys the trypanosome but falls short of occasioning blindness. As this is a risky venture physicians will do well to avoid the drug altogether, especially as more effective other organic arsenic preparations are available. The dose ranges from 1 1/2 grains to 5 grains in 10 per cent solution per day, given hypodermatically. Hare gives the proper dose (hypodermatically and intramuscularly) for all the diseases mentioned as 7 grains in a 5 to 15 per cent sterilized solution, on two successive days, followed by intervals of ten days' rest.

ARSPHENAMINE.

Arsenobenzol (Dioxy-diamido-arsenobenzol dihydrochloride). Salvarsan (discarded German name). "606". (Formula: $HCl\ NH_2\ OHC_6\ H_3$ As. or As $C_6\ H_3\ OHNH_2\ HCl + 2H_2O$). A synthetic organic compound of arsenic.

Description.—A fine, yellow, crystalline, hygroscopic powder, freely soluble in water, methyl alcohol, and in glycerin, less soluble in alcohol (ethylic) and insoluble in ether. Owing to ready change through oxidation into a more poisonous compound it is kept in vacuum ampules. When opened the compound should be used *at once*, for it becomes powerfully toxic when exposed. After opening none of it should be saved for future use. *Dose*, 1 to 9 grains in specially-prepared solution for injection (see below).

Action and Toxicology.—Injected into the muscles, severe pain, prolonged induration, swelling, and sometimes sloughing occur. Intravenously used it is less apt to produce, in most instances, any marked symptoms. Sometimes, however, severe pain, chills, and nausea follow, or headache, dizziness, nausea, and malaise, with fever, take place. Vomiting, diarrhœa, and jaundice, shortness of breath, great nervous unrest, and muscular tremor have been produced, as well as profuse sweating and various skin eruptions. The more severe intoxications show facial œdema and cyanosis, with mental confusion, tetanic convulsions, collapse, and coma ending in death. Meningitis and encephalitis with attendant fever and subsequent coma have been the result in some instances, and seemingly nephritis, with anuria, in a few. Disturbances of hearing and paralysis of the facial and spinal nerves have been noted. Arsphenamine appears to be eliminated in the urine and feces, first as arsenic and later as inorganic arsenic compounds. About 25 per cent of it is unaccounted for, but in all probability it is stored up in the tissues, notably those of the liver, bone marrow, and kidneys, as such depositions have been observed in animals. Arsenic has

been detected in the tissues for ten days after the administration of arsphenamine. This compound is destructive to protozoa and especially the spirilla, trypanosomes, and spirocheta, and devitalizing to the *Treponema pallida* in the body fluids.

Therapy.—Arsphenamine is Ehrlich's famous "606" so-called because he made 605 compounds before he reached this product, which he hoped would prove a specific cure for syphilis. Chemically it is "Arsenobenzol," or more specifically "Dioxy-diamido-arsenobenzol dihydrochloride". It depends for its virtues upon its arsenic content, which corresponds to 31.57 per cent of metallic arsenic. It appears to be able to destroy the *Treponema pallida*—the micro-organism of syphilis, in the body but not in the test-tube, or as it is stated, "*in vivo* but not in *vitro*". The process is a complicated one, taking place somewhat after the biologic process of complement-fixation.

Arsphenamine is unquestionably the most rapidly acting antagonist of the spirocheta of syphilis—the *Treponema pallida*. The hope that it would prove curative in the single large dose, as at first employed, was never realized. While the most brilliant results sometimes occur from its use in even a few hours or few days, especially in clearing up and sterilizing the visible lesions of syphilis, it fails to completely eradicate the luetic infection. It is now recognized that it must be given at long intervals in order to produce even partial results. Very rarely, in the first days after infection shows it seems to have jugulated the disease at once; but this time only can prove. More usually the symptoms gradually return, and the recognized tests for the presence of the treponema reveal the fact that these creatures are renewing their vigor and activity. While the early furor was going on concerning its absolute curative power, this infallibility was not credited by Eclectic physicians, and the relative value of the drug was weighed and the probable return of the symptoms predicted by the more conservative of them. Many also scouted the probability of its value at all. Time, however, has established its status in medicine, and it is now quite generally conceded that it has undoubted power over the spirochetes, though that power is but one of control and limitation of activity rather than that of cure. Conservative syphilologists have from the beginning contended that the usually recognized antisyphilitic treatment is necessary conjointly with the occasional injection of arsphenamine. It is a most active remedy *in* syphilis, seldom a cure *for* lues; and it is best adapted to the predestructive phases and must not be expected to do the impossible—to regenerate destroyed tissue. Hence it fails in the remote and ultimate, or parasyphilitic stages involving bone destruction and nervous degeneration caused by the disease.

In view of what has been said and experience attests, arsphenamine acts best in the early stage of syphilis, the earlier the better, when the chancre is present and there are mucous patches and cutaneous syphilides. It is usually prompt in impressing fulminant cases. In recent infections its effects have been little short of marvelous, but as the disease progresses—from week to week—so wanes the power of the drug to stay its ravages. Used very early the organisms fail to show in the initial lesions, and these heal rapidly. The mucous plaques and the skin blemishes quickly fade away. When secondaries occur, however, then the drug's action must be

fortified by that of older antisyphilitics. Of these the practitioner of the dominant school relies almost exclusively upon the mercurials. The Eclectic does not deny the antiluetic and devitalizing effect of the latter upon the spirochetes, but deplores their abuse and consequent destructive effects upon their host. Often, perhaps oftener than formerly, Eclectics use tentatively small doses of mercury, as did Scudder in employing Donovan's solution; Howe in advising biniodide, and others various other preparations of mercury. But these were always sparingly and guardedly employed, and only when well marked indications were present and not merely because the disease was syphilis. This, of course, was before the spirochetes were known. The majority of Eclectics preferred, and some still employ vegetable alteratives and the iodides, and sometimes gold and sodium chloride. A few now use mercury because they are not obsessed by the fear that was born of the knowledge of the abuse of mercurials in the early days, when these salts were so destructively employed and made the life of the syphilitic a living death. Nowadays, owing to much greater care and smaller dosage, mercurial salivation and tissue destruction are rarely observed, and the more progressive physicians of all schools use any remedial agent that will hasten a cure with the least possible harm to the body. This is indeed a phase of specific medication. Therefore many are rationally using the newer arsenic compounds, arsphenamine and neo-arsphenamine, together with their own peculiar antisyphilitic medication, whether it be purely organic, or the iodides and mercury compounds.

Arsphenamine appears to be effective in any stage of syphilis so far as clearing up ulceration is concerned. Gummata of the skin are bettered by it, but it has less effect upon those of the viscera. In syphilis of the nervous system, with degeneration, it practically has been a failure, if indeed it has not often provoked an aggravation of symptoms. In acute syphilitic brain lesions it should be used with the greatest caution, and had better not be used at all on account of the active inflammation it may induce.

Arsphenamine is said to be equally effective in some protozoal diseases, as frambœsia (yaws) and malaria, and in the spirillar forms of infection, as relapsing fever, sleeping sickness (a form of trypanosomiasis), and in Vincent's angina. In the latter it is used locally in powder, as by injection alone it cannot invade the necrotic tissue of the throat. In malaria it is less effective and far more poisonous than quinine.

The method of employing arsphenamine is largely one of choice on part of the administrator. Three methods are in vogue, all by injections: (1) Intramuscular; (2) subcutaneous; (3) intravenous, (and rarely, per rectum). The first is quite commonly followed but is regarded as less desirable than the last, which is the method followed by a large majority of physicians. The subcutaneous method has been almost abandoned. As the preparation of the drug requires the utmost care and as the dosage as to quantity and time varies greatly under different conditions, the student is advised to consult special treatises for these methods before attempting the use of arsphenamine. The test of effectiveness is the final failure of the Wassermann reaction in infected cases, followed by a negative luetin reaction, made at long and stated intervals until these tests show a complete absence of spirochetes. This may cover a period of months and sometimes years.

Many deaths have occurred from arsphenamine treatment, some probably due to faulty preparation or administration, and others directly to the drug itself—no matter how carefully prepared or how carefully used. It is by no means always a safe medicine. Some of the deaths are probably due to a phlebitis, releasing thrombi which finally reach the heart and stop its action—or more commonly to defective kidneys, or when these organs have been permanently damaged by the previous use of mercurials. This latter is freely admitted by old school authorities.

Arsphenamine is contraindicated in great emaciation and malnutrition, in status lymphaticus, Addison's disease, in myocarditis, and advanced degeneration of the heart, vessels, or brain, coronary sclerosis in the old and feeble, and those suffering from diabetes or severe nephritis, ulcer of stomach, in advanced tuberculosis, carcinoma, and in acute cerebral syphilis.

Administration.—Stated briefly, the following are some of the methods of using arsphenamine:

1. By intramuscular injection into the buttocks, using a suspension of the drug in a neutral fluid. This is the most common manner of employing the neutral suspension. While said to be less irritating than either an acid or a clear alkaline fluid-form, necrotic tissue-masses, with sloughing, have resulted. It is not now so popular a form of administering arsphenamine as in the beginning of its therapy.

2. The use of the acid solution (arsphenamine dissolved in warm water or warm salt solution) is seldom resorted to at the present time because it is the most irritating and toxic form and produces both pain and local death of the tissues. When employed it was by subcutaneous and intramuscular injection.

3. A mono-acid form (aqueous solution half neutralized with alkali) is also very irritating and now seldom used.

4. Oil and paraffin suspensions, though not highly irritating nor seldom causing necrosis, are too slow in action for most cases. They are sometimes employed, however, upon infants and in those in which a very slow absorption is intended. If used at all it is best to employ ready-prepared products in sealed ampules than for the operator to prepare them himself.

5. By far the best form of administration for the majority of cases is the *intravenous injection by gravity* (sometimes by syringe) *of the dilute alkaline solution of the disodium salt in distilled water or in normal salt solution.*

Few attempt nowadays to sterilize the patient with a single large dose of arsphenamine. A number of smaller doses are preferred—0.3 Gm. (5 grain) to 0.5 Gm. (7 grains) of arsphenamine or of neo-arsphenamine being given once or twice a week until from three to ten or a dozen doses have been administered, the limit being determined by the clinical effects and serologic tests. It should be borne in mind that a Wassermann test made within a week of the last injection is not expected to be of much value, while a later test may be confirmatory or negative according to the effect of the treatment. The giving of mercury coincidentally with the injections is condemned by the best syphilologists as dangerous and sometimes fatal;

if used, it must be some time after an injection of the arsenic salt. If arsphenamine be given after mercurial treatment, or in "mixed treatment", renal irritation may result in the retention of arsenic side-products which may prove fatal. Wechselman emphatically declares that "the conjoint use of salvarsan with heavy mercurial treatment is dangerous. If one will use the combined treatment, then let him give mercury very carefully many days after giving the last salvarsan injection, but he should not reverse the rule" (Kolmer, *Infection, Immunity, and Specific Therapy*).

At no time is the arsphenamine treatment without danger and the greatest precaution should be taken in every instance of its use. It is the better policy to have the drug administered by one who specializes in syphilology. Arsphenamine is regarded as a more efficient spirocheticide than neo-arsphenamine, but the latter is the more convenient, can be given in lesser bulk, and is more easily prepared for use. In every case to which either is to be administered the stomach should be empty, the bowels cleared by a purge or enema, and the urine examined for albumen and casts, and for sugar. After the administration the patient should rest over night under observation, the dose having been given preferably in the late afternoon or early evening. Sometimes an exception to this rule is permissible in the cases of the use of neo-arsphenamine in the robust, when but an hour or two's rest is required.

An approved method of administering arsphenamine is the following: After carefully examining the ampule to see that it is intact and that the salt is a yellow powder (not gray or brownish) and wiping it with alcohol, the neck is filed and broken and the contents *dusted* upon the surface of sterile, freshly distilled water (about 50 mils or c. c.) contained in a proper flask and already brought to the boiling point. Caustic soda solution (15 per cent) kept in a non-soluble glass container is now to be added drop by drop until neutralization is effected—as is known by the use of exactly enough of alkali to form a clear solution. A single extra drop of alkali may be added to take care of any precipitate upon cooling. Any further excess acts as an irritant. According to Citron the following quantities of alkali will be required for exact neutralization: 8 drops of 15 per cent sodium hydroxide solution for 0.2 Gm. of arsphenamine; 12 drops for 0.3 Gm.; 15 or 16 drops for 0.4 Gm.; 19 or 20 drops for 0.5 Gm.; 23 or 24 drops for 0.6 Gm. The finished product of fluid for 0.6 Gram (9 grains) of salvarsan should be, according to Kolmer, about 200 mils (6 1/4 fluidounces), or for 0.4 Gram (6 grains) about 150 mils (5 fluidounces): though injected very slowly it may be given in 30 to 50 mils (1 to 1 7/8 fluidounces). Kolmer believes that there is no advantage in salt solution over distilled water, but that if the former is desired, the arsphenamine should be dissolved first in the distilled water, neutralized, and then the desired volume arrived at by the addition of sterile 0.5 per cent solution of chemically pure sodium chloride.

By whatever method arsphenamine is used, each vessel and piece of apparatus should be thoroughly sterilized. The prepared solution, when ready for injection, should be poured into the gravity apparatus, passing the fluid through sterile gauze to filter out any extraneous or insoluble matter, as bits of glass, etc. The apparatus for injection will vary with the case

and the taste of the operator. Some use a two-cylinder outfit—one tube each for arsphenamine and for salt solution, the use of either or a mixture of the two being permitted at will by means of a three-way stop cock. Others use a single cylinder such as is employed in administering normal salt solution. All the precautions should be observed, and the technique as for intravenous injections in general should be followed. Care should be had that none of the arsphenamine comes into direct contact with perivenous tissue, preferably by using salt solution preceding and following that of the drug. The administration should consume from 10 to 20 minutes, the patient lying upon a couch or operating table. The dose of arsphenamine for men is from 0.4 to 0.6 Grammes (6 to 9 grains); for women 0.25 to 0.5 Gm. (4 to 8 grains); in poorly nourished, weak adults, 0.3 to 0.4 Gm. (3 to 6 grains); infants, 0.024 to 0.04 Gm. (1/3 to 2/3 grain); older children, 0.2 to 0.3 Gm. (3 to 4 grains). ☞ *Remember always that the drug must be prepared only immediately before it is to be injected.*

In all arsphenamine medication the smaller doses repeated at proper intervals are favored above the full doses.

SUBSTITUTE FOR ARSPHENAMINE.

Neo-arsphenamine (discarded German name, Neo-salvarsan—Ehrlich's 914) is a yellow crystalline powder forming a neutral solution with water, in which it is very soluble. Exposed to air it readily oxidizes. Its arsenic content is about 20 per cent. For injection it must be dissolved in warm distilled water and used at once lest it change quickly into the poisonous paramidophenolarsenic oxide. Unlike arsphenamine it does not require the addition of an alkali. The dose for both intramuscular and intravenous use is from 1 to 20 grains dissolved in about an ounce of warm (not hot) sterile water, according to age and condition: the average for an adult being about 7 grains. Before intramuscular use the part may be desensitized by the injection of a few drops of a 1 per cent solution of procaine. This salt is less toxic than arsphenamine, and also probably correspondingly less effective. It has occasioned chills and fever, depression of the heart action, and anuria. It is used by many in preference to arsphenamine because of its lesser poisonous qualities and its ease of preparation, no alkali being required in preparing the solution. The latter should not be shaken strongly in preparation, as agitation seems to favor oxidation—a change to be carefully guarded against. It has the same contraindications as arsphenamine.

Administration.—Neo-arsphenamine, on account of its ready solubility and the non-necessity of alkalinization, may be added to the proper quantity of sterile, warm, freshly distilled water (100 to 150 mils) and gently agitated, when a clear solution will result. At no time should the solution be strongly heated, nor should *hot* water be used in its preparation. After filtration into the injecting apparatus it is then ready for use. While best administered in any suitable gravity apparatus, neo-arsphenamine is often injected by means of a large-sized Luer's syringe, a process that must be slowly and carefully conducted. *Dose*, 0.6 to 0.9 Gram (9 to 14 grains); in the same ratio for the weak and malnourished as for arsphenamine. The more common dosage of neo-arsphenamine is 0.6 Gm. (9 grains), for three or more injections at

intervals of a week or more. For a carefully-worked out consideration of Salvarsan and Neo-salvarsan therapy the reader is referred to Kolmer's "*Infection, Immunity, and Specific Therapy.*"

Important precautions in administering Arsphenamine and Neo-arsphenamine have been issued (1919) by the United States Public Health Service of the Treasury Department, as follows:

Experience has shown that the untoward results occasionally associated with the administration of arsphenamine are due in a large measure to the use of too highly concentrated solutions of the drug, to too rapid administration, and to insufficient care in rendering the solution slightly alkaline.

The reader, therefore, may be interested in studying the following instructions just issued to medical officers of the Public Health Service regarding the administration of arsphenamine and neo-arsphenamine. Careful observance of the precautions here described will reduce the number of reactions from the use of these drugs.

General Directions.—The ampule, before opening, should be immersed in 95 per cent alcohol for 15 minutes in order to detect any crack or aperture not primarily recognizable. (Should such a breach be discovered, the contents of the ampule should be discarded.)

Arsphenamine.—(1) *Solution.* Cold, boiled, freshly distilled water should be used in all cases except in the case of "arsenobenzol" made by the Dermatological Research Laboratory, in which case hot water is required. No more solution should be prepared at one time than can be given in 30 minutes.

(2) *Neutralization and alkalinization of the above solution.*—With a graduated pipette or burette add 0.9 cc. of normal NaOH for each 0.1 Gm. of the drug (i. e., 5.4 cc. for each 0.6 Gm.). The alkali should be added all at once and should quickly convert the acid salt solution of arsphenamine into the alkaline salt solution, or the disodium salt of the arsphenamine base. (The solution of arsenobenzol, which is hot, should be cooled before adding the alkali.) This represents slightly more alkali than just enough to redissolve the precipitate formed by the addition of this reagent.

The alkali used should be standardized against normal acid. Normal NaOH is a 4 per cent solution of the c. p. product. However, if made on the basis of weight, it may be considerably less than this strength, hence the necessity for titration. It could be made up in amount sufficient for a month's use if kept in a well-stoppered bottle and exposed to the air for only a few seconds at a time when using the solution. It should be kept in a bottle that has been used for NaOH solution for some time, so that all action it causes in the glass will have occurred. Where it is impossible to have this made up at the station, it will be furnished upon request from the Hygienic Laboratory. Should the NaOH solution become cloudy or contain a precipitate, it should be discarded.

(3) *Concentration of the drug.*—It is desired to emphasize the fact that the concentration of the drug should not be greater than 0.1 Gm. to 30 cc. of final solution. The practice of using concentrated solution is not only in direct conflict with the instructions on the circular, but carries a distinct hazard to the patient.

(4) *Method of injection.*—The gravity method only should be used. Where several patients are to be injected from the same solution, the container for the solution should be graduated. If not already graduated, this can be done in a few minutes by sticking on a strip of adhesive plaster and marking the graduations on this. A convenient way to do this is to have each mark represent 30 cc., with a long mark for each 180 cc.; then, if the volume is made up so that each 0.1 Gm. of drug is contained in each 30 cc., the doses can be given accurately. It is a great convenience to have a glass stopcock near the glass tubing, which serves as a window just above the needle in order to control the rate of injection. If no stopcocks are at hand, the rate can be controlled by the size of the needle and the height of the column of fluid. A No. 18 or 20 B. & S. gauge is the best sized needle.

(5) *Rate of injection.*—Operators should pay particular attention to the rate of administration and in no case should it exceed 0.1 Gm. of drug (30 cc. of solution) in two minutes. This point is especially emphasized because it is believed that excessive rapidity of administration accounts for more unfavorable results in the use of arsphenamine than any other one thing.

Neo-arsphenamine.—The principal precautions to be observed in the administration of neo-arsphenamine are:

(1) Only a single ampule should be dissolved at a time. This drug must not be dissolved in bulk to be given to a series of patients.

(2) Cold water only should be used.

(3) The dilution should be not stronger than 0.1 Gm. of the drug in 2 cc. of freshly distilled water

(4) A very small needle should be used, and the time of injection of the dose should not be less than five minutes.

ASAFŒTIDA.

A gum-resin derived from the rhizome and rootlets of *Ferula Asafœtida*, Linné; *Ferula fœtida*, Regel, and other species of Ferula (Nat. Ord. Umbelliferæ). Persia and other parts of Western Asia. *Dose*, 1 to 10 grains.

Common Names: Asafetida, Gum Asafetida.

Principal Constituents.—A volatile oil and a bitter resin to both of which its virtues are mostly due; also gum. The unpleasant odor is due to the presence in the oil of allyl sulphide chiefly.

Preparations.—1. *Emulsum Asafœtidæ*, Emulsion of Asafetida (Milk of Asafetida). *Dose*, 1 fluidrachm to 1 fluidounce.

2. *Tinctura Asafœtidæ*, Tincture of Asafetida. *Dose*, 5 to 30 drops.

Specific Indications.—"Nervous irritation, with mental depression, headache, and dizziness; hysteroidal conditions; convulsive disorders from purely functional wrongs of the stomach, gastro-intestinal irritation, with flatulence and palpitation of the heart; dry, deep, choking bronchial cough" (*American Dispensatory*).

Action.—Asafetida is a general excitant causing quickened breathing and heart-action, genito-urinary irritation, increased sexual desire, and mucous feces. It also increases the bronchial secretion. In overdoses it may cause dizziness and headache.

Therapy.—Asafetida is carminative and antispasmodic, and is a very useful nervine for functional spasmodic affections. It is especially adapted to neurotic individuals subject to hysterical or emotional attacks, usually attended by flatulent distention of the abdomen. In gastric discomfort with flatulence and nervous excitability, and in the flatulent colic of children and flatus due to intestinal indigestion of old persons, asafetida is extremely satisfactory. Tympanites occurring during fevers is often relieved by it, for its carminative influence is especially effective upon the lower bowel. Owing to its expectorant qualities it is occasionally serviceable in the bronchitis of the aged, in which secretion is free but the power to expectorate is weak. It is also an ideal sedative for the nervous cough following the active stage of whooping cough. It relieves the nervous irritability of dentition. On the whole asafetida is a simple and efficient remedy best adapted to disorders with nervous depression, more or less feebleness, and particularly if associated with constipation, flatulence, or tardy or imperfect menstruation. Asafetida is contraindicated by inflammation. It may be given in emulsion, tincture, or pill or capsule.

ASARUM.

The rhizome and rootlets of *Asarum canadense*, Linné (Nat. Ord. Aristolochiaceæ). A native perennial of the United States found in rich soils in woods, mountains, and along road sides. *Dose*, 5 to 30 grains.

Common Names: Wild Ginger, Indian Ginger, Canada Snakeroot.

Principal Constituents.—An acrid resin, a spicy volatile oil, and thought to contain among other fractions, *methyl-eugenol*, a principle not before found in nature.

Preparations.—1. *Tinctura Asari*, Tincture of Asarum. *Dose*, 1/2 to 2 fluidrachms.

2. *Infusum Asari*, Infusion of Asarum (℥ss; Water, Oj). *Dose*, ad libitum.

3. *Syrupus Asari*, Syrup of Asarum. *Dose*, fl ℥j to fl ℥ij.

Action and Therapy.—A very pleasant stimulating carminative, diaphoretic and emmenagogue, of considerable value in amenorrhœa from recent colds, in atonic dysmenorrhœa, and in flatulent colic. A warm infusion is a very good diaphoretic with which to "break up a cold". Asarum may

is added to cough mixtures, and with syrup forms a very agreeable vehicle for the administration of pectoral medicines to be used in the chronic coughs of debility to aid expectoration. It is contraindicated by gastro-intestinal inflammation.

ASCLEPIAS.

The root of *Asclepias tuberosa*, Linné (Nat. Ord. Asclepiadaceæ). United States and Canada. *Dose*, 5 to 60 grains.

Common Names: Pleurisy Root, Butterfly Weed, Orange Swallow-wort.

Principal Constituents.—Resins and a glucoside.

Preparation.—*Specific Medicine Asclepias. Dose*, 1 to 60 drops. (*Usual form of administration:* Specific Medicine Asclepias, gtt. xx, to ℥ij; Water, ℥iv. Mix. Sig. One teaspoonful every 1 or 2 hours.)

Specific Indications.—"Pulse strong, vibratile; skin moist; pain acute, and seemingly dependent on motion" (Scudder). Skin hot and dry, or inclined to moisture; urine scanty; face flushed; vascular excitement marked in the area supplied by the bronchial arteries; inflammation of serous tissues; gastro-intestinal catarrhs due to recent colds.

Action.—The physiological action of asclepias is not extensive, but important. Asclepias slows the action of the heart and lowers arterial tension. It especially relieves local hyperæmia by vaso-motor control. Through some unexplained, though probably circulatory regulating action upon the sweat-glands it produces a true diaphoresis, including the elimination of both solids and liquids, the latter sparingly and almost insensibly. Its regulation of the true secretion of the skin more nearly resembles that of normal or insensible perspiration than that caused by any other diaphoretic, corallorhiza possibly excepted.

Therapy.—Asclepias is one of the most important medicines for broncho-pulmonic inflammations and catarrhs, and an agent for re-establishing suppressed secretion of the skin. It is the most perfect diaphoretic we possess, so completely does it counterfeit the normal process of insensible perspiration. When the secretion of sweat is in abeyance it restores it; when colliquative it restrains it through its effect of promoting normal functioning of the sudoriparous glands. It may be indicated even though the patient be freely perspiring, for sometimes when the liquid excretion is abundant there is a retention of the solid detritus, the removal of which is one of the effects of asclepias. By softening and moistening the skin, temperature is safely reduced. Asclepias never causes an outpouring of drops of sweat. If such occurs, it is due to bundling with bed-clothing, or the too copious administration of either hot or cold water with it. Given in alcoholic preparations, in the usual small doses, it merely favors the re-establishment of natural secretion. While asclepias is serviceable when the temperature is high, it does its best work when heat is but moderately exalted, and when the skin is slightly moist, or inclined to moisture, and the pulse is vibratile and not too rapid. In fact, in febrile and inflammatory disorders asclepias is not a leading remedy, but is largely a necessary accessory. If the pulse be rapid and small, aconite should be given with it; if rapidly bounding, large and strong, veratrum. While useful in disorders of adults, especially old persons, asclepias will be most often indicated in diseases of infants and children. While it acts best when strictly indicated, it is almost never contraindicated in acute respiratory affections.

In acute chest diseases asclepias is useful to control cough, pain, temperature, to favor expectoration, and restore checked perspiration. When cough is dry and there is scant bronchial secretion, asclepias stimulates the latter and thus relieves the irritation upon which the cough depends. In chest disorders requiring asclepias our experience verifies the classic indications for it.

The asclepias condition in broncho-pulmonic disorders shows either a hot and dry skin, or there is pungent heat of the skin with inclination to moisture, the pulse is usually full and active and even may be bounding, much as when veratrum is indicated. The face is flushed, there is, in children particularly, marked restlessness, and more or less febrile reaction. In chest disorders there is pain upon motion—pleural pain—and the cough is short, hacking, barking, rasping, and nervous—and restrained as much as possible on account of the pain and soreness it occasions. Bronchial secretion is arrested, though that of the skin may be in evidence. The early Eclectics were neither dreaming nor romancing when they voiced their verdict concerning the great value of pleurisy root in pleuritic and other chest affections.

With the conditions named asclepias is of the very greatest value in acute coryza, la grippe, acute bronchitis, pleuro-pneumonia, and pneumonia, both catarrhal and croupous. Its use should be begun early, usually in association with other agents sure to be indicated, and continued through the active stage; and if a dry cough persists it should still be continued and used freely. There is no kindlier cough medicine than asclepias, and when fever is present it is an ideal aid to the special sedatives. Asclepias should form an important part of the medication in acute pleurisy and pleurodynia, conditions in which it is most efficient and in which it first earned a therapeutic reputation. It may need to be fortified by the intercurrent use of aconite or bryonia, or both, and in any case it will enhance the value of these agents.

In pneumonia and in bronchitis asclepias is best adapted to the acute stage, where the lesions seem to be extensive, taking in a large area of the parenchyma of the lung or the bronchial structures and the mucosa. Webster declares it best adapted to control vascular disturbances in the area supplied by the bronchial arteries, and suggests that by reserving it for this use we shall lessen its liability to confusion with other appropriate remedies. In the convalescent stage of pneumonia and other respiratory lesions, when expectoration is scanty and dyspnœa threatens, small doses of asclepias are helpful. It renders a similar service in dry, non-spasmodic asthma. The dose for these purposes should be about 5 drops of the specific medicine.

Asclepias is an admirable or adjuvant remedy for the acute catarrhal states of the broncho-pulmonary or gastro-intestinal tracts when produced by recent colds. Full doses will sometimes "break" ordinary colds. Asclepias, euphrasia, and matricaria are the best three agents for "snuffles" or acute nasal catarrh of infants. In the irritable mucosa and distressing cough of phthisis it is a suitable agent, being also useful to control the excited circulation and excessive sweating, as well as being sedative to the stomach. In the acute gastro-intestinal disorders of a catarrhal type,

especially in the very young who are impressed by the variable weather of the summer season, asclepias in small doses frequently proves a helpful remedy. It is adapted to those of weak constitutions, sensitive stomach, and alternate attacks of diarrhœa or dysentery. These disorders frequently occur in wet seasons, or when a cold, wet spell quickly follows the exhaustive heat of very hot seasons. By aiding the checked perspiration less of a burden is put upon the internal organs, and this is the work which asclepias does. It sometimes relieves flatulent colic in infants and headache in children due to disordered digestion. The fractional doses are preferred.

Asclepias is of special utility in measles for at least three purposes: It alleviates the distressing cough, assists in an early determination of the eruption, and controls the present and after catarrhal phenomena. Though not often thought of in glandular and skin disorders, it is an ideal medicine in mumps and sometimes in mastitis, while for skin affections with excessive cutaneous dryness it assists other agents by its moistening diaphoresis.

Altogether asclepias is one of the most kindly acting and safest agents in the materia medica for one that accomplishes so much. One can scarcely do harm with it.

For pleural pain employ specific medicine asclepias in *hot* water preferably, using from ten to thirty drops in an ounce of hot water, every half hour, or hour. Carried too far it may cause nausea and vomiting, especially if the doses are large and the water merely warm. For cough and other purposes, employ the specific medicine in the usual way, in cold water, alone or in combination with other indicated agents. As a pectoral and expectorant the compound emetic tincture, which contains asclepias, administered in water, syrup or glycerin, or suitable proportions of either of the latter two with water, is very effectual in dry chronic forms of cough.

ASCLEPIAS CORNUTI.

The root of *Asclepias Cornuti*, Decaisne (Nat. Ord. Asclepiadaceæ). Common in rich soils throughout the United States. *Dose*, 1 to 60 grains.

Common Names: Milkweed, Common Milkweed, Silkweed, Wild Cotton.

Principal Constituents.—The milky juice contains a caoutchouc-like body. The root contains a glucoside, not yet fully determined and a volatile oil and a bitter principle.

Preparation.—*Tinctura Asclepiadis Cornuti*, Tincture of Asclepias Cornuti (℥viii; Alcohol, Oj). *Dose*, 5 to 60 drops.

Action and Therapy.—*External.* It is a common practice among the laity to remove warts by the application of the fresh, milky juice of the plant. Krausi believed it effective in removing small epitheliomata.

Internal. As the root possesses tonic, diuretic, and anthelmintic properties it may be used occasionally for the functions indicated. The heart-action is stimulated by it, and it has been suggested as a useful remedy in muscular rheumatoid affections, acting much like macrotys. Constipation is said to be favorably influenced by it, and in full doses it is recommended to expel intestinal worms. The drug deserves study.

The young "shoots" or turiones are a favorite pot-herb or "greens" in some sections of our country.

ASCLEPIAS INCARNATA.

The root of *Asclepias incarnata*, Linné (Nat. Ord. Asclepiadaceæ). Common in damp and wet grounds throughout the United States. *Dose*, 1 to 60 grains.

Common Names: Flesh-colored Asclepias, Swamp Milkweed, Swamp Silkweed, White Indian Hemp, Rose-colored Silkweed.

Principal Constituents.—A fixed and a volatile oil, two acrid resins, and an unstable amorphous alkaloid *asclepiadine*, resembling emetine in action.

Preparation.—*Specific Medicine Swamp Milkweed. Dose*, 1 to 60 drops.

Action and Therapy.—Diuretic and vermifuge. There is good reason to believe this agent a good diuretic to be substituted for digitalis in cases of œdema dependent upon cardiac insufficiency. Its action is similar to that of foxglove, without the irritating effects upon the gastric membranes. In fact, in small doses it is a stomachic and of some value in chronic catarrh of the stomach. In powder, 10 to 20 grains, 3 times a day, it is said to expel lumbricoids.

ASEPSIN

The trade name of a proprietary compound prepared from wintergreen oil. (Formula: $C_8 H_7 O_3 Na$.)

Description.—A definite sodium compound occurring as a white, crystalline powder, of a sharp sweetish taste, and the agreeable odor and flavor of wintergreen oil. Completely soluble in hot and cold water; nearly insoluble in cold alcohol, chloroform, and ether, but soluble in boiling alcohol and ether. Alkaline in reaction, and decomposed by nearly all acids, producing oil of wintergreen. *Dose*, 1/10 to 1/2 grain, rarely 1 grain.

Preparations.—1. *Solution of Borated Asepsin* (Fearn), (Asepsin, ʒj; Glycerin, fl ʒij; Sodii Boras, ʒj; Aqua Destillata, fl ʒvj. Triturate the asepsin with the glycerin added by fractions. Dissolve the Borax in the Distilled Water, and lastly, mix the two solutions by agitation). For internal and external use.

2. *Asepsin Soap.* A pure tallow soap into which is incorporated borax and asepsin. A fine detergent and antiseptic soap, especially useful for the infant's toilet and for use in dry, scaly, rough skin, and where sebaceous secretion is faulty. It may be had in transparent or in opaque form.

Specific Indications.—Fermentation and putrefaction; pale tongue or dusky discoloration of throat and tongue; fermentative dyspepsia with atony, flatulence, and colicky pain; tympanites; borborygmus; feeble capillary circulation, with tendency to breaking down of tissue.

Action.—Asepsin, in solution, imparts a sense of slipperiness to the skin. It slightly liquefies albumen. A 10 per cent solution causes warmth in the skin, while stronger solutions are irritant, reddening the epiderm and imparting a sense of stiffness. It does not, however, harden the integument. Solutions of 20 per cent or more are mildly caustic, but do not leave a scar, nor dry the secretions. Mucous tissues are energetically attacked by it, imparting to them a strong feeling of warmth, and taken internally it causes an appreciable rise in temperature. It quickens breathing, increases the secretion of urine, to which it imparts its odor, and produces mildly increased perspiration. Large doses cause intense burning in the stomach, with dryness of the fauces. Both heat and dryness are felt in the rectum upon defecation. Asepsin is not readily absorbed unless minutely triturated with starch or milk sugar, but passes through the bowels as a methyl salicylate. When absorbed it may be detected in the urine, both by its odor and by the tests for salicylic acid. The digestive ferments are not affected by it; on the contrary, minute doses of it appear to encourage digestion.

Asepsin is powerfully antiseptic, antiputrefactive, and anti-fermentative. It is also decidedly and agreeably deodorant. It checks alcoholic fermentation in cider. Watkins' comparative experiments with beef, fish, and mutton in solution respectively in distilled water, mercuric chloride and asepsin proved that asepsin retarded change three times as long as the bichloride, and without the alteration of the texture of the tissues produced by the latter; and that asepsin checked the decomposition already occurring in a fragment removed from one of the other solutions.

Therapy.—*External.* Asepsin is a fine local antiseptic and detergent. It may be used before slight operations to cleanse the parts. After thoroughly removing the asepsin and completely drying the surface, iodine may then be applied. Solutions of asepsin may be used to cleanse crushed and machinery injuries of dirt and grease. Wounds treated with a weak solution of asepsin, or asepsinated distillate of hamamelis, heal quickly and kindly. For contusions, cuts, scratches, abrasions, and lacerations, and particularly cuts from glass, thorns, or barbed wire or old tin, all of which seem to produce excessively painful ragged injuries, the following lotion is unexcelled: ℞ Asepsin, gr. xx; Echafolta, f℥ss; Distillate of Hamamelis, Distilled (or boiled) Water, aa, q. s., f℥iv. Mix. Sig. Apply freely on sterile gauze. After the pain has been controlled by Carron oil and the parts cleansed with asepsinated water, an ointment or cerate of asepsin may be applied to burns and scalds to promote healing, with less likelihood of resulting in cicatrization than by almost any other form of treatment. The parts should never be allowed to become dry. Sometimes a wet dressing is preferred for small burns. Ten grains of asepsin may be added to equal parts of water and distilled witch hazel to make 4 ounces and applied upon gauze. As a wash for foul ulcers, mammary abscesses, cracked nipples, empyema, and ulcerating buboes an aqueous solution of the desired strength is both cleansing and deodorant. For fetid feet and offensive armpits it is an excellent deodorizer, and dusted full strength upon cancerous growths it almost completely masks the stench. A 20 per cent solution of asepsin will remove vegetative growths.

Many skin diseases requiring thorough cleansing and alkaline medication may be well treated with a solution, glycerite or ointment of asepsin. It is especially useful in rhus poisoning, porrigo, chronic eczema, and crusta lactea. A solution of asepsin is deodorant and stimulating to old tibial ulcers, and an asepsin ointment gives great relief in pruritus ani and sometimes comfort in itching piles.

A solution of asepsin alone or combined with hamamelis, sodium sulphite, or potassium chlorate is very effectual in tonsillitis and the angina of scarlet fever; and assists materially in the removal of the false membrane in diphtheria. For the soreness sometimes following tonsilectomy the following gives relief from pain and promotes rapid healing: ℞ Asepsin, gr. x; Glycerin, f℥ij; Tincture of Myrrh, f℥j; Water, q. s.; f℥iv. Mix. Sig. Use as a spray every hour until relieved. An albolene solution of asepsin and menthol is useful in coryza and nasal catarrh, and ozæna, and controls the distressing sneezing and itching in periodic hyperesthetic rhinitis (hay fever). Or an ointment of 5 to 10 grains of asepsin in 1 ounce of petrolatum may be used. In extreme necessity 1 grain of cocaine hydrochlorate may be added.

A solution of asepsin, alone or with menthol, makes a good mouth wash in fevers, and especially for the insane, who are prone to allow particles of food to accumulate in the mouth and give rise to dental caries and foul breath. It may be combined in powdered or liquid dentifrices. The asepsinated myrrh solution mentioned previously is a good dentifrice when there are spongy gums and in pyorrhea alveolaris. Fearn used an asepsinated borax for similar purposes, as well as a wash for foul discharges from the bladder and for purulent conjunctivitis. Previous to dental operations asepsin may be used as a cleansing wash, and sprinkled in the water before mixing it may be used in preparing plaster for taking impressions for teeth. It gives an agreeable flavor and prevents nausea.

After pelvic operations and in obstetrical practice solutions of asepsin are of great worth to deodorize and cleanse. For foul smelling leucorrhœa the solution of borated asepsin is agreeable and effective; and it is sometimes useful as an injection in gonorrhœa in both man and woman.

Asepsin Soap.—An unirritating soap for cleansing the skin and for use in enemata and douches for gynecological and obstetrical purposes. Useful for the removal of dandruff, crusts, and greasiness of the scalp, and to hasten desquamation after the eruptive fevers. Used also in dry scaly eczema, in rhus poisoning, acne, comedones, milium, herpes, seborrhea, impetigo, pruritic and parasitic skin diseases, and as a wash for ulcerations. The lather may be allowed to dry upon the surface, or after 15 to 30 minutes may be removed by hot or cold water, as indicated. Used in this manner it is the most effective agent to remove the brownish scurfy scales from the scalp of infants, first softening the surface with olive oil.

Internal. When not contraindicated asepsin may be added to water-dispensed medicines as a flavor and preservative. With resinous medicines it serves to make clearer mixtures and appears to render them more efficient. Such is the case with podophyllum and macrotys. It should not be added to solutions containing large amounts of toxic alkaloids, as of aconite, belladonna, gelsemium, or opium, lest its strong alkalinity cause precipitation so that the patient's life may be endangered by getting a large quantity of the precipitated alkaloids in the last doses of the medicines.

As an antifermentative and corrector of putrefaction asepsin has been used in typhoid fever, cholera infantum, diarrhœa and dysentery with fetid evacuations. The dose must be minute lest increased temperature be provoked. In fractional doses it favors digestion when sluggish, and when eating is followed by disagreeable and offensive ructus. A good form of administration is: ℞ Asepsin, gr. v to xv; Sodium Bicarbonate, ℥j; Triturate well. Sig. Dose, 1 to 3 grains. A clean white tongue, pale or dusky mucosa, gastric fermentation, flatulence and tympanites are the indications. Magnesia may be substituted for the bicarbonate when the latter increases the distress by sudden liberation of carbon dioxide. In gastric disorders it may be combined with many peptics and correctives as ingluvin, nux vomica, hydrastis, sodium sulphite or potassium chlorate. Asepsin and magnesia may be given in gastric ulcer with excessive hyperchlorhydria, and in gastric carcinoma to overcome the stench. Catarrhal forms of stomach and intestinal dyspepsia are sometimes benefited by it; and that unpleasant

rolling of gases in the intestines (borborygmus) so common and so annoying to women is best relieved by asepsin.

Like all the salicylates, asepsin is useful in acute articular rheumatism. It may be given with the other salicylates to modify their taste and increase their value, but cannot be given alone in sufficiently large doses to be effective in controlling the disease, without increasing the fever and acting as a gastric irritant. Thomas reports the effective use of asepsin in an alarming case of uterine hemorrhage from a fibroid tumor, in which the patient was gradually becoming anemic and dropsical. A teaspoonful of a solution of 10 grains of asepsin in four ounces of water was administered every half hour or hour during the hemorrhage and four times a day during the interval.

ASPIDIUM.

The rhizome of *Dryopteris Filix-mas* and of *Dryopteris marginalis*, Asa Gray (Nat. Ord. Filices). World-wide ferns of the Northern Hemispheres. *Dose*, 1 to 4 drachms.

Common Names: (1) Male Fern; (2) Marginal Shield Fern.

Principal Constituents.—Oils, resins, *filicin*, and *filicic acid*, the poisonous principle.

Preparation.—*Oleoresina Aspidii*, Oleoresin of Aspidium (Oleoresin of Male Fern). *Dose*, 30 grains but once a day. Do not give with oils.

Action and Toxicology.—When freely absorbed the oleoresin causes nausea, vomiting, purging, severe abdominal pain, headache, dizziness, muscular prostration, tremors, cramps, dyspnœa, cold perspiration, cyanosis, collapse, and death. In some cases amblyopia results, and permanent visual and aural disturbances have resulted from its toxic action. Unless the doses are excessive or frequently given, or given with oil, as castor oil, such accidents are less likely to occur. The treatment consists in stimulation by ammonia and purging by Epsom salt.

Therapy.—A most certain tænicide, effectually removing tapeworm, especially the *Bothriocephalus latus* and the *Tænia solium*, and said to be less effective upon the *Tænia medio-canellata*. Prepare the patient in the usual manner over night for the administration of tænicides by purging and fasting. In the morning administer 30 grains of the oleoresin in capsules or flavored emulsion, follow at midday with a full meal without fats, and in the evening give a brisk saline cathartic. Under no circumstances must oils, especially castor oil, be given with it during the treatment. They favor absorption of the filicic acid, thought to be the toxic principle. Aspidium is seldom used; the oleoresin being preferred. The latter is also effectual against the hook-worm (*Uncinaria americana*).

ASPIDOSPERMA.

The dried bark of *Aspidosperma Quebracho-blanco*, Schlechtendal (Nat. Ord. Apocynaceæ). An evergreen tree of Chili and the Argentine Republic. *Dose*, 5 to 60 grains.

Common Name: Quebracho.

Principal Constituents.—Six alkaloids: *Aspidospermine* ($C_{22}H_{30}N_2O_2$), Aspidospermatine ($C_{22}H_{28}N_2O_2$), Aspidosamine ($C_{21}H_{28}N_2O_2$), Quebrachine ($C_{21}H_{26}N_2O_2$), Hypoquebrachine ($C_{21}H_{26}N_2O_3$), and Quebrachamine, the latter sometimes absent.

The commercial amorphous Aspidospermine is a mixture probably of all the alkaloids or is chiefly Aspidosamine.

Preparations.—1. *Fluidextractum Aspidospermatis*, Fluidextract of Aspidosperma, (Fluidextract of Quebracho). *Dose*, 5 to 60 drops.

2. *Aspidospermine*. 1/4 to 1/2 grain.

Specific Indications.—Dyspnœa of functional origin, with or without emphysema; face pale, anxious and livid; lips cyanotic; pulse small, soft and compressible, irregular or intermittent; cardiac palpitation with cough.

Action.—The various alkaloids of quebracho act more or less antagonistically to each other, but the chief good effect is the increase in depth and regulation of the rate of respiration. It should not be used intravenously.

Therapy.—Querbacho is a remedy for dyspnœa when not due to pronounced organic changes. Being a centric stimulant to the pneumogastric it affects chiefly the cardiac and pulmonary plexuses, and is a remedy of power in imperfect oxygenation with a disturbed balance between the pulmonic circulation and the action of the heart. It is used in cardiac and renal asthma, emphysema, the dyspnœa of capillary bronchitis and of chronic pneumonia, advanced bronchitis, phthisis, bronchial asthma and uncomplicated asthma with insufficient cardiac force. It relieves the cough of la grippe, when associated with dyspnœa. From 5 to 60 drops of the fluidextract may be given in water or plain or aromatized syrup.

ATROPINA.

Atropine.

A solanaceous alkaloid derived chiefly from Belladonna.—(Formula: $C_{17}H_{23}O_3N$.)

Description.—Odorless, white, prismatic crystals, easily dissolved by alcohol or chloroform, less soluble in ether or glycerin, and sparingly in water. *It should never be tasted except in great dilution and then with extreme caution. Dose*, 1/200 to 1/100 grain (average dose, 1/120 grain).

Preparation.—*Atropinæ Sulphas*, Atropine Sulphate. Odorless, efflorescent, microscopic crystals, or a white powder readily soluble in water, glycerin, or alcohol, sparingly soluble in chloroform and almost insoluble in ether. *Observe the same cautions as for Atropine* (see above). This salt is preferred to Atropine on account of its greater solubility in the commonly-employed solvents. *Dose*, 1/200 to 1/60 grain (average dose, 1/120 grain).

Action.—Belladonna and atropine are cerebral excitants and arrestors of secretion, and their dominant full action is that of depression or paralysis of the peripheral nerve terminals. The general action from small, medium, and toxic doses are given under Toxicology. It will be observed that small doses stimulate, medium doses suppress secretion by depression of the terminal nerves, full medicinal doses cause a febrile state, while toxic amounts paralyze. The rapidity of the heart's action is due, first, to stimulation of the sympathetic cardiac ganglia (accelerator) and, secondarily, to paralysis of the terminal filaments of the vagus—a state of increased motor activity with decreased inhibitory power. The capillaries are contracted by belladonna, but in poisonous doses dilated, allowing a fall of blood-pressure, and being due to paralysis of the muscular layers of the vascular coats, and not to cardiac depression. The latter takes place only when the drug is given in overwhelming doses. While full doses of atropine or of belladonna cause dilatation of the capillaries of the skin, they contract those of the splanchnic circulation, a fact taken advantage of in the treatment of shock. Owing to vaso-motor paresis, the temperature falls from toxic doses. Atropine causes mydriasis when taken internally by being carried in the blood-current directly to the eye and there acting, as when locally applied, by causing paralysis of the terminals of the oculo-motor nerve, and it is thought also by stimulating peripheral filaments of the sympathetic. It

destroys the power of accommodation and strongly increases intra-ocular tension, a fact to be remembered in treating those having or disposed to glaucoma.

Atropine, by its control over the peripheral nerve-terminals, checks all the secretions of the body, except those of the kidneys and the bowels. Even small amounts entirely stop the salivary output and probably have a partially similar action upon the gastric and pancreatic juices and the bile. As the nasal, faucial and bronchial glands are similarly affected there occur the marked hoarseness, thirst, and dysphagia so characteristic of the drug. The innervation of the sudoriparous glands is depressed so that dryness of the skin results. Upon the secretion of milk, however, the repression is only partial, as the mammary glands are capable of functioning independent of nervous assistance.

The voluntary muscles are but little or not at all affected by atropine; involuntary or non-striated muscles are strongly depressed by it. Atropine is said to lessen peristalsis, as it slows the action of all tubular organs. Sometimes, immediately after injecting or giving atropine, the intestinal movements are quickened. This has been explained by declaring that the inhibitory endings of the splanchnic nerves are depressed before those of the motor control. However, as the musculature of the bowels has an activity entirely independent of nerve control, movements are not greatly interfered with and cathartics and other irritants cause free action even under belladonna administration, the latter chiefly serving the purpose of blunting the sensory terminals and thus preventing griping and tormina. While even small doses of atropine cause some primary dryness of the gastro-intestinal tract, there is some reason to believe that through the complex nerve action mentioned above it also allows of secretion, for slight laxative effects often follow it and belladonna. Atropine increases tissue waste and is itself eliminated very quickly and almost wholly by the kidneys. The urine so charged is capable of dilating the pupil of another animal or person.

Locally, atropine when applied with penetrating solvents, paralyzes the sensory nerve terminals so that it proves both anodyne and anæsthetic. The sensory control is not so apparent when the drug is given internally, though it tends to lessen pain caused by irritant cathartics.

Except in degree, the toxic effects of belladonna and its chief alkaloid—atropine—are practically identical. Small doses cause dryness and constriction of the throat, with possibly disordered vision and such unpleasant head symptoms as vertigo and confusion of ideas. Moderate doses provoke a greater degree of dryness of the mouth and throat, on account of which there follows marked difficulty in swallowing. The pulse is slowed, the pupils dilated, accommodation defective, and vision confused. The skin becomes dry and hot and a considerable rise of temperature may take place. When, however, a dose large enough to produce vaso-motor paresis is taken, the temperature falls.

Toxicology.—Large and toxic doses greatly increase the dryness and dysphagia and giddiness, the patient reels or staggers when he walks, there is great thirst, and sometimes drowsiness and nausea and vomiting occur. The saliva now becomes suppressed, breathing is rapid, and dilation of the pupil extreme. Vision is either lost, or indistinct, and double. The

pulse-rate may be doubled and the volume is full and hard. A characteristic scarlet efflorescence, resembling that of scarlatina, but lacking the punctations and subsequent desquamation of the latter, now overspreads the countenance and progresses upon the neck and body. This redness is usually bisected by a whitish streak leading from the angles of the mouth to the cheek bones, giving to the face a rather grotesque appearance. The eyes are brilliant and staring, and the conjunctivæ may be congested. A peculiar active delirium accompanies and is of an illusional and loquacious character. The victim, though oblivious of his surroundings, sees visions, entertains spectres, has fancies and hallucinations, and other phantasmagoria, and gives way to laughter and gayety; again the cerebral disturbance may be of a wild, maniacal type, with furious delirium and fighting propensities. Loss of speech often occurs early, though repeated movements of the tongue and lips indicate the efforts to articulate. Purging, vomiting, and unsuccessful attempts to micturate are frequent, though not constant symptoms of belladonna poisoning. Finally, with (rarely) or without convulsions, occurs a complete abolition of function, stupor sets in, the pulse becomes rapid and weak, the limbs cold, and death results from centric respiratory paralysis. Should the patient recover he seldom recollects any of the circumstances of his illness. A livid or cyanotic countenance is seldom observed in poisoning by atropine.

Extreme dryness of the throat and mouth, dysphagia, scarlet efflorescence, without puncta, widely dilated pupils, staring eyes, suppression of urine, and talkative or wild delirium should lead one to suspect belladonna poisoning. In medication the first four symptoms should be a warning to cease the administration of belladonna or its alkaloid. Death is not very common from atropine poisoning, though, owing to its wide use, toxic results are frequent. In countries where belladonna grows children are often poisoned by eating its berries.

The treatment of belladonna poisoning should be prompt. If seen early, emetics, the stomach-pump, lavage tube, and tickling the throat to provoke emesis should be resorted to at once. The irritant or local emetics, as mustard, zinc sulphate (20 grains), or powdered ipecac, may be used; if the case is seen before absorption has taken place, or if there is not much depression 1/8 grain of apormorphine hydrochloride may be given subcutaneously. As imperfect chemical antidotes, tannin and animal charcoal or solution of iodine may be useful. Strychnine should be injected to sustain respiration, and artificial heat and forced respiration should be resorted to. If the heart is not weak, pilocarpine, or eserine (physostigmine), may prove physiologically antagonistic, but they should be used with care. While by no means a settled fact that morphine and atropine are in all respects antagonistic, with the probabilities in favor of their being but partially so, it is still recognized that morphine may be judiciously employed as an antidote to belladonna and atropine. If used, one should be governed by the pupillary response, giving it in small doses until contraction is gradually induced. If there is a tendency to pulmonary œdema the greatest caution should be observed in its use. Purgatives, such as castor oil, are useful to free the intestines from the poison, and sweet spirit of nitre to facilitate its removal by way of the kidneys. During the attack retained

urine should be drawn by catheterization to prevent resorption of the atropine. One half grain of atropine killed a middle-aged man, death being delayed until the sixth day; 1 grain hypodermatically proved fatal to another.

Therapy.—*External.* Atropine sulphate is used locally to relax spasm, alleviate pain, and as a mydriatic and cycloplegic. For most external applications, except in ophthalmic practice, belladonna is to be preferred to atropine, being more controllable and less likely to induce toxic effects.

Atropine sulphate is employed oftener than any other agent except homatropine hydrobromide, in ocular therapeutics as a cycloplegic to relax or paralyze accommodation and as a mydriatic to dilate the pupils where a prolonged effect is desired to facilitate examinations of the interior of the eye and to determine refraction. Especially is atropine used upon examining the eyes of young persons. If not necessary to maintain these effects except for short duration, homatropine hydrobromide, or sometimes cocaine, is used in its stead. That the latter dries out the cornea and damages it must ever be kept in mind. When a drug is needed to prevent or break up adhesions, or to prevent contraction of the iris, or its protrusion into or through corneal ulcers, atropine is by far the agent of choice. It is largely employed in the operation for cataract. In iritis it is the drug to be used from start to finish. In central perforating corneal ulcer it should be employed sufficiently strong and often enough to keep up a continuous ciliary paralysis, thereby insuring full dilatation of the pupil and to prevent the iris from adhering to the ulcerated cornea. Iritis following cataract operation is prevented by atropine, and it should be used in deep interstitial keratitis. In the acute stage of phlyctenular keratitis it may be applied to check the flow of tears and relieve the sensitiveness to light, but its use should be discontinued as soon as the acute inflammation has subsided. It may be very carefully used in ophthalmia neonatorum, when the cornea becomes hazy, to prevent involvement of the cornea and deeper tissues of the eye. In all these conditions a one per cent solution is preferred, a few drops being instilled until proper effects are produced and maintained. Only freshly prepared sterile solutions should be employed; and even when every precaution has been observed atropine will sometimes irritate violently, producing "atropine conjunctivitis". Under such conditions, homatropine hydrobromide is substituted by many.

Atropine *should not be used* when there is glaucoma; in phlyctenular keratitis after subsidence of the acute inflammation; in keratitis with superficial vascularity; in marginal corneal ulcers; in all cases of hypertension of the globe of the eye; and should not be used if there can be any other choice in old persons, on whom it is frequently dangerous, and in whom it may produce glaucoma.

Atropine, in 2 to 4 per cent warm solution, instilled into the aural canal, relieves the pain of earache, non-suppurative otitis media, and diffuse inflammation of the canal. While it is a pain and spasm-relieving drug, it is less manageable in acute mammitis and in spasms of the sphincters and the tubular organs of the body than extract of belladonna.

Internal. As a general medicine atropine is sometimes used to fulfil many of the purposes for which belladonna is prescribed. It does not,

however, fully represent the action of the latter, is less controllable and not so satisfactory. Therefore, its substitution for the parent drug has not been looked upon with favor by Eclectic physicians. It has been reserved for special conditions and as an emergency remedy. Atropine, like belladonna, has five well-defined fields of action: to relieve purely nervous pain; to relax painful spasms of unstriped muscles; to arrest excessive secretion of sweat, saliva, and milk; to contract the splanchnic capillaries in shock; and to a lesser extent (internally) as a mydriatic, though its local action for this purpose is greatly preferred. Atropine is an efficient drug in purely nervous neuralgia, and may be given to relieve the intercostal, trifacial, and the sciatic forms, being useful in the order named, though it often fails in the latter. In other painful visceral neuroses, as gastralgia, enteralgia, and uterine and ovarian neuralgia, atropine sometimes promptly relieves. The more purely nervous the type, the better it acts. Atropine is used largely to control excessive ptyalism and to check colliquative sweating of phthisis and other debilitated conditions.

Administered hypodermatically, atropine sulphate is one of the most valued vaso-stimulants in shock, and in cases where collapse of the respiratory and cardiac functions is threatened. It is also used to support breathing, and as the physiological antidote in acute poisoning by morphine (opium), eserine (physostigmine), muscarine (mushroom poisoning), and pilocarpine; and to sustain the respiration in strychnine poisoning and chloroform and ether narcosis. It is frequently administered with morphine to modify the unpleasant action of that alkaloid, and before anesthetization with chloroform, to lessen excitement, protect respiration, and to prolong the action with a lesser quantity of the anæsthetic.

AURANTII AMARI CORTEX.

The dried rind of the fruit of *Citrus Aurantium amara*, Linné (Nat. Ord. Rutaceæ). *Dose*, 5 to 30 grains.

Common Names: Bitter Orange Peel (of Bitter Orange, Bigarade Orange, Seville Orange).

Principal Constituents.—*Hesperidin*, a crystalline, bitter glucoside; isohesperidin, water soluble; *aurantiamarin*, the bitter principle; and a volatile oil.

Preparation.—*Tinctura Aurantii Amara.* Tincture of Bitter Orange Peel. *Dose*, 1/2 to 2 fluidrachms.

Therapy.—Stimulant, carminative and tonic, but used chiefly as a flavoring agent. This preparation is contained in both Compound Tincture of Cinchona and Compound Tincture of Gentian.

AURANTII DULCIS CORTEX.

The outer rind of the ripe, fresh fruit of *Citrus Aurantium sinensis*, Gallesio (Nat. Ord. Rutaceæ).

Common Names: Sweet Orange Peel (of Sweet Orange, Portugal Orange, China Orange).

Principal Constituents.—Oil of orange (*Oleum Aurantii*); other constituents same as in Bitter Orange Peel. (*Orange Juice* [from the pulp of the fruit] contains citric acid, sugar and mucilage.)

Preparation.—*Tinctura Aurantii Dulcis*, Tincture of Sweet Orange Peel. *Dose*, 1 fluidrachm. This agent is used in the preparation of Syrupus Aurantii or Syrup of Orange—a syrup containing also Citric Acid.

Specific Indications.—(For Orange Juice). Deep red tongue, with brown to black coating; scurvy.

Therapy.—*Sweet Orange Peel.* Slightly stimulant, carminative, and tonic. Used almost wholly as a flavoring agent. It makes an elegant addition to acid solution of iron dispensed in syrup. (See Liquor Ferri Acidi.) It is also an agreeable addition to the bitter infusions, as of quassia or Peruvian bark.

Sweet Orange Juice. The juice of the orange is a light refrigerant article of diet, and is especially useful where the bowels are sluggish in action, and during convalescence from illness, as well as to be given during fevers and the exanthemata where acids are craved. It is par excellence the remedial agent in scurvy of infants, as well as adults, and if given early will abort this unpleasant disorder. Like all acids, orange juice is best indicated when the patient's tongue is deep-red or coated brown, black, or any intermediate color.

AURI ET SODII CHLORIDUM.

Gold and Sodium Chloride.

A mixture of equal parts, by weight, of anhydrous Gold Chloride and anhydrous Sodium Chloride, representing when dried, not less than 30 per cent of metallic gold.

Description.—An odorless, orange-yellow powder of a saline and metallic taste, deliquescent in damp air, and freely soluble in water. *Dose*, 1/60 to 1/10 grain.

Specific Indications.—Hereditary and acquired syphilis with tongue abnormally red and contracted; hyperplasia of tissue.

Action.—Gold salts act very much like those of mercury. Small doses improve the appetite and digestion, full doses cause gastric irritability, loss of appetite, and nausea. Long continued use produces fever (auric fever), ptyalism without ulceration or tenderness of the gums, and its further effects are nervous erethism and the constitutional conditions similar to those induced by corrosive sublimate. The sexual organs are stimulated to excess by them and menstruation rendered abnormally free. They are eliminated chiefly by the kidneys, though to some extent by the skin and bowels. Poisoning by them is treated with the same antidotes and in the same manner as for mercury compounds.

Therapy.—Gold and sodium chloride was formerly used to a considerable extent in chronic interstitial nephritis, and later in mental (hypochondriacal) and bone and periosteal disorders. It is probably most effective when these are occasioned by luetic infection. Outside of some introduced uses from homœopathic sources, especially in eye and ear disorders, the chief use of the drug in Eclectic medicine has been in the secondary and tertiary phases of syphilis and the skin lesions depending upon a syphilitic diathesis. It seemingly acts best when the tongue is contracted and redder than normal and the skin circulation fairly active. When buboes are present they are of the indolent and nonsensitive variety. The preferred doses are from 1/60 to 1/10 grain, from 1 to 3 times a day, administered in pill or capsule. It is a very little used drug.

AVENA.

The unripe seed of the *Avena sativa*, Linné, and the farina derived from the ripened seed (Nat. Ord. Graminaceæ). Probably indigenous to Sicily and to an island off the coast of Chili. Cultivated everywhere.

Common Names: Oat, Common Oat.

Principal Constituents.—Starch, oil, albumen, potassium and magnesium salts, silica, and a nitrogenous body, *avenine*.

Preparations.—1. *Avenæ Farina*, Oatmeal. Chiefly a food and to prepare oatmeal water.

2. *Tinctura Avenæ*, Tincture of Avena. (Cover best unripe oats [in milk] with strong alcohol.) *Dose*, 1/2 to 2 fluidrachms.

3. *Specific Medicine Avena*. *Dose*, 1/2 to 2 fluidrachms.

Specific Indications.—Nervous exhaustion; nervous debility of convalescence; cardiac weakness of nervous depression; nocturnal losses following fevers and from the nervous erethism of debility; nervous headache from overwork or depression.

Action and Therapy.—Oatmeal water is sometimes useful to dilute "baby foods" and milk when children are not well nourished and suffering from summer diarrhœal disorders. It is also used as a demulcent drink in diarrhœa and dysentery of adults. When so used, it should be about the consistence of milk.

Oatmeal gruel, when not otherwise contraindicated, as in diabetes mellitus or amylaceous indigestion, is an excellent and easily digested food in convalescence from exhaustive illness. It may be sweetened if desired.

A paste, made by moistening a small quantity of oatmeal, held in the hands, with water, will soften roughened skin of the palms and fingers; and also remove the odor of some substances, as iodoform.

Tincture of Avena is a mild stimulant and nerve tonic. It is regarded by many as a remedy of some importance for nervous debility, and for affections bordering closely upon nervous prostration. It seemingly acts well in the exhaustion following typhoid and other low fevers and is thought to hasten convalescence, particularly where there is much nervous involvement and enfeebled action of the heart. In the nervous erethism or the enervated conditions following fevers and giving rise to spermatic losses it is sometimes effectual, but it seldom benefits such a state when due to prostatic irritation, masturbation, or sexual excesses. It may be given to relieve spasms of the neck of the bladder; and in some cases of relapsing rheumatism. Webster asserts it is useful, not as an antirheumatic, but for the debility underlying the rheumatic diathesis, so that the patient is less affected by meteorologic influences. Probably its chief value as a medicine is to energize in nervous exhaustion with or without spasms. It is useful in headache from exhaustion or overwork, or the nervous headache of menstruation. It is not a remedy of great power and will be found effective, probably, in but few of the conditions mentioned. However, many agents of this type sometimes, in exceptional cases, accomplish that which no other remedy seems to do. To fortify some of the claims made for this remedy is to unwisely challenge the credulity of physicians of bedside experience. The much-heralded reputation of this drug to enable the morphine habitué to throw off the habit has not been sustained. In our own experience we have utterly failed to accomplish any good with it in any form of drug habit.

BALSAMUM PERUVIANUM.

A balsam obtained from *Toluifera Pereiræ* (Royle) Baillon. San Salvador in Central America; called Balsam of Peru because first exported to Europe from Peru.

Common Names: Balsam of Peru, Peru Balsam.

Description.—A dark brown, heavy fluid of syrupy consistence, without stickiness and non-hardening in the air, and having a vanilla-like odor, and an acrid, bitter persistent taste. It is soluble in alcohol and chloroform.

Principal Constituents.—*Cinnamein* or *benzylic cinnamate* ($C_9H_7(C_7H_7)O_2$) constitutes 60 per cent of Peru balsam. Other constituents are *vanillin*, *styracin*, a fragrant oil and a large proportion of resin.

Action.—Skin eruptions have been produced by applying the balsam to the skin, as hives, eczema, and erythema; sometimes the latter results from its internal use. These effects are thought to be due largely to impurities in the factitious drug, which is oftener sold than the genuine balsam. A good and true product allays dermal irritation and that of the mucosa, and has decided antiseptic and parasitic properties. Large doses cause gastro-intestinal irritation, with vomiting and diarrhœa. Internally it causes increased circulation, some cutaneous warmth, and augments the flow of urine and the bronchial secretions. It is excreted by the respiratory mucosa, skin, and kidneys, upon which it probably exerts an antiseptic effect.

Therapy.—*External.* Balsam of Peru is a good parasiticide and has given the best of satisfaction in scabies and for the destruction of lice. For the former it may be combined with the sulphurated ointments, or may be used alone, with an oleaginous and petrolatum base (balsam, 25 parts; olive oil, 50 parts; petrolatum, 100 parts). We prefer the former preparations. The latter combination is useful in pediculosis, both to kill the nits and the lice. Balsam of Peru, either full strength or in desired dilution with oils or petrolatum, may be used to cure ringworm of the scalp and other forms of tinea, in chronic eczema, and is splendidly effective in senile and other forms of pruritus, especially pruritus vulvæ, and in chilblains. As a stimulant to ulcers of low vitality and pus-oozing granulations following operations, and similar conditions in burns, abscesses, and wounds, the old-time use of the balsam has been revived in surgery, applying it in 5 to 15 per cent solutions in castor oil, and covering well with several layers of gauze to allow of free drainage. This method is one of the best forms of treatment for old tibial ulcers, due to varicosis, but the patient must be compelled to rest the leg in a horizontal position for some weeks in order to insure results. The same solution may be poured into small granulating sinuses, produced by drainage tubes, that refuse to heal. Beef marrow, 1 ounce; quinine, 10 grains; and balsam of Peru, 1 drachm, has been advised in alopecia.

Internal. Balsam of Peru is a stimulating expectorant and is of some value to restrain secretion in the bronchorrhœa of the aged. It has a similar restraining effect upon catarrhal conditions of the gastro-intestinal and renal tracts and is sometimes of advantage in stubbornly resisting gonorrhœa. Peru balsam should not be used in inflammatory or febrile conditions; and its use should be discontinued if it produces gastro-intestinal irritation.

BAPTISIA.

The recent root and leaves of *Baptisia tinctoria*, Robert Brown (Nat. Ord. Leguminosæ), a perennial shrub-like plant, indigenous to North America.

Common Names: Wild Indigo, Indigo Weed.

Principal Constituents.—A poisonous alkaloid *baptitoxine* (*baptisine*); two glucosides, *baptisin*, non-poisonous, and *baptin*, laxative and cathartic; and a yellowish resin. Baptitoxine is identical with cystisine, ulexine, and sophorine, toxic principles found in other active plants, and resembles sparteine in its action upon the heart.

Preparations.—1. *Decoctum Baptisiæ*, Decoction of Baptisia. (Recent root of Baptisia ℥j, Water Oj.) *Dose*, 1 to 4 drachms; employed chiefly as a local application.

2. *Specific Medicine Baptisia.*—*Dose*, 1 to 20 drops; as a topical wash or dressing, fl℥j to fl℥ij to water Oj. *Usual form of administration*: ℞ Specific Medicine Baptisia, gtt. xx; Water, fl℥iv. Sig.: One teaspoonful every 1 to 2 hours.

Specific Indications.—Fullness of tissue, with dusky, leaden, purplish or livid discoloration, tendency to ulceration and decay (gangrene); sepsis, with enfeebled circulation; fetid discharges with atony; stools resembling "prune juice" or fetid "meat washings"; face swollen, bluish, and resembling one having been frozen or long exposed to cold; typhoid conditions.

Action.—Large doses of baptisia may provoke dangerous emeto-catharsis, sometimes so violent as to induce gastro-enteritis. The evacuations are soft and mushy, and the effort is often accompanied by a general bodily discomfort or soreness. Profuse viscid ptyalism also occurs. Small doses are laxative; and the drug also appears to stimulate the intestinal glands to secrete more freely and probably increases hepatic secretion. Baptitoxine is said to quicken the breathing and accelerate and strengthen the heart-beat; but in toxic doses it paralyzes the respiratory center, thus causing death by asphyxiation.

Therapy.—*External.* Locally the decoction and the specific medicine baptisia (diluted with water) are effective as washes and dressings for indolent and fetid as well as for irritable and painful ulcers, inflammations with full or swollen and dusky tissues, and tendency to destruction, aphthous and nursing sore mouth, mercurial gingivitis, sore nipples, and ulceration of the cervix uteri, with foul, sanious, or muco-purulent leucorrhœa. Its internal exhibition hastens its local action in these conditions.

Internal. Internally, baptisia is indicated in pathological conditions characterized by feeble vitality, suppressed or vitiated secretions, and sepsis with a disposition to disintegration and death of tissues. These indications are manifest in the peculiar appearance of the parts affected, of the membranes, and of the patient as a whole. There is a peculiar duskiness of a bluish or purplish hue of the skin and mucous structures, and usually there is fetor. The face has a bluish, swollen appearance, with expressionless countenance, like one who has been long exposed to cold. There may be ulcers of an indolent character, with bluish or purplish edges. The excretions are fetid—those of the bowels being dark and tarry, or resembling the "washings of raw meat or prune juice." Baptisia is not, as a rule, a remedy in acute diseases showing great activity, but rather for disorders showing marked capillary enfeeblement and tendency to ulceration—in fact, a condition of atony. It is contraindicated by hyperæmia; indicated by capillary stasis.

Baptisia is important for its influence upon typhoid conditions. It is quite generally regarded as one of our most effective antityphoid agents.

Here we encounter the dusky appearance of the skin and membranes, the sleek, beefy tongue with pasty coating, the fetor of mouth, sordes upon teeth and lips, and the sluggish capillary flow. Its usefulness in typhoid or enteric fever is one of record. One or more of the foregoing symptoms will be present with the addition of the characteristic pea-soup, meat washings or prune juice stools, or tar-like viscous evacuations, showing the admixture of decomposed blood. In fact, it is likely to be indicated by any form of persistent diarrhœa accompanying this type of fever. Typho-malarial fever, which is most generally predominantly typhoid, is equally influenced for good by baptisia. Typhoid dysentery and typhoid pneumonia, so called, are helped by it just in proportion to the typhoid element present. In dysentery the greater the evidence of intestinal ulceration the stronger the call for baptisia.

For septic conditions other than typhoid, baptisia is distinctly useful. In putrid forms of sore throat, with great stench and full, dusky tissues, the angina of scarlet fever, and tonsillitis, with sluggish circulation and fetid exudate, and also when necrotic, baptisia holds a high rank as a remedy. It is often valuable as an aid in the treatment of diphtheria, but alone should not be relied upon to conquer this vicious disease. When most useful the tissues will be swollen, dusky, or blanched, the secretions free, and the parts sloughing. Indeed, the most important indication for the drug is the tendency to disintegration of tissues. Baptisia is very valuable in putrid ulcerations of the nasal passages—in fetid catarrh, ozæna, and similar disorders with stench and turgidity. Under these circumstances it overcomes the putrescency, restrains the discharge, and promotes healing of the ulcerated surfaces.

In all of the local disorders mentioned, baptisia should be given internally as well as applied locally.

BARBITAL.

Diethylamalonylurea, Barbitonum, Veronal (the German name discarded in America). A chemical compound of urea.

Description.—A fine white crystalline powder, odorless and having a faint bitter taste. Soluble in about 150 parts of water. *Dose*, 5 to 10 grains (in capsule, conseal, or cachet).

Preparation.—*Barbital Sodium* (discarded German name, Medinal). More soluble than barbital (1 in 5 of water), therefore it can be more conveniently given in solution by mouth, rectum, or subcutaneously. Used same as barbital, but acts more rapidly because more quickly absorbed. *Dose*, 5 to 10 grains in sweetened water, capsule, or tablet; 7 grains (hypodermatically).

Specific Indication.—Insomnia with nervous excitability.

Action and Toxicology.—This drug is reputed to have no action upon the blood or breathing, and to resemble trional in effect. In ordinary doses it has no after-effects, and loses in power when given nightly for a fortnight or more. Very full doses occasion staggering gait, tremors, and hallucinations; while excessive doses (exceeding 150 grains) produce death after a prolonged sleep. A lethal dose subcutaneously injected disorders the heart action and breathing becomes irregular, the Cheyne-Stokes type comes on and death terminates a long period of sleep.

Therapy.—This drug is decidedly hypnotic and to some degree alleviates pain. It is almost entirely used for the relief of nervous insomnia, in which it is reputed to act safely and satisfactorily when the indicated dosage is not exceeded.

BELLADONNA.

The (1) dried root and the (2) dried leaves and tops of *Atropa Belladonna*, Linné (Nat. Ord. Solanaceæ). Europe and Central Asia; also cultivated. *Dose*, (1) 1/4 to 1 grain; (2) 1/4 to 2 grains.

Common Names: Deadly Nightshade, Dwale. (1) Belladonna Root (Belladonnæ Radix); (2) Belladonna Leaves (Belladonnæ Folia).

Principal Constituents.—The poisonous alkaloids *atropine* (see Atropina), *hyoscyamine*, *belladonnine*, and *hyoscine*. There is much confusion concerning the constituents of belladonna, hyoscyamine, with conversion products, probably being the chief alkaloid. This is readily convertible in atropine. The alkaloids probably exist as malates.

Preparations.—1. *Specific Medicine Belladonna* (prepared from the root). *Dose*, 1/20 to 1 drop. *Usual method of administration:* ℞ Specific Medicine Belladonna, gtt. v to x; Water, fℨiv. Mix. Sig.: One teaspoonful every 1 to 3 hours.

2. *Unguentum Belladonnæ*. Ointment of Belladonna. (This is prepared from the Extract of Belladonna, which in turn is prepared from Belladonna leaves. Tincture of Belladonna is also prepared from the leaves, while the fluidextract is prepared from the root.)

Specific Indications.—Dull expressionless face, with dilated or immobile pupils, dullness of intellect, drowsiness with inability to sleep well whether there is pain or not; impaired capillary circulation either in skin or mucous membranes; dusky, deep-red or bluish face and extremities, the color being effaced by drawing the finger over the parts, the blood slowly returning in the whitish streak so produced; circulation sluggish, with soft, oppressed, and compressible pulse; cold extremities; breathing slow, labored, and imperfect; hebetude; the patient sleeps with eyes partially open; coma; urinal incontinence; free and large passages of limpid urine; fullness and deep aching in loins or back; spasm of the involuntary muscles. In 3x dilution the indications are: Pallid countenance, with frequent urination; nervous excitation, with wild and furious delirium. Large doses: mydriatic.

Action.—The action of Belladonna depends largely upon its chief alkaloid *Atropine*. (*See Atropina*).

Therapy.—*External.* Belladonna, and more rarely atropine, may be applied for the relief of pain and spasm, and especially for spasmodic pain. A lotion of belladonna (5 to 10 per cent) may be used to allay itching in general pruritus, eczema, and urticaria. The tincture, painted upon the feet, controls local bromidrosis. A weak lotion is effectual in general hyperhydrosis and in the colliquative sweating of phthisis and other debilitating diseases. The ointment and liniment may serve a similar purpose. This use of belladonna is less desirable, however, than other medication on account of the dryness of the throat and mouth, and the ocular disturbance it is likely to occasion.

Ointment of belladonna and the liniment are extremely useful in local inflammations and swellings, having a wide range of efficiency. Thus they may be applied to painful and swollen joints, forming abscesses, incipient and recurrent boils, buboes, hemorrhoids and fissures, inflamed glands, and in neuralgia, chronic rheumatism, lumbago, myalgia, pleurodynia, the chest pains of pulmonary tuberculosis, and in acute mastitis. In many of the surface conditions mentioned the plaster may prove most effectual. The liniment is especially useful to alleviate cramps in the calf of the leg.

The ointment is effectual in relaxing rigid os during labor, and carried into the urethral canal of male or female it relaxes spasmodic constriction of that canal and cystic spasm and relieves pain. Rubbed on the under surface of the penis it has given marked relief in chordee. A suppository of belladonna relieves spasmodic dysmenorrhœa and may be applied either in the vagina or the rectum. A similar application, with or without tannin or geranium, may be inserted into the vagina for painful menstruation, with leucorrhœa. The liniment and the ointment may be used as antigalactagogues and are especially serviceable after weaning the child or when mastitis threatens. All local applications of belladonna should be made with judgment and carefully watched lest poisonous absorption take place. In many of the conditions mentioned the conjoint internal use is advisable —provided the specific indications for the drug are present.

Therapy.—*Internal.* Belladonna is employed in Eclectic Therapeutics in doses which produce exactly the opposite effects from the gross or physiologic and toxic action. Large doses paralyze; small doses stimulate. While employed for its physiological effects in some instances, the chief use of the drug with us is in conditions showing impairment of the capillary circulation in any part of the body with congestion or tendency to blood stasis. The size of the dose is of great importance in administering belladonna. Ordinary drachm doses of a dilution of 5 to 10 drops of the specific medicine in four ounces of water meet conditions of dullness, hebetude, and congestion, as first pointed out by Scudder. Others claim that the use of infinitesimal doses, of the 3x dilution, acts promptly in conditions of nervous exaltation, with great irritability and impressionability of all the senses; in some cases the hyperæsthesia amounts to delirium and it is then claimed to be most efficient to control both mild and furious outbreaks of delirium. Others again (and this agrees with our personal experience) find marked pallor of the surface, with contracted pupils, the indication for minute doses of the drug. Following a law which appears to be commonly borne out in therapeutics, that opposite effects are produced by large or by minute doses respectively, belladonna seems a possible therapeutic agent in many varied conditions. The cases, however, in which belladonna appears to have rendered the best service are in those in what might be called medium doses, as advised by Scudder, in which the drug is employed to overcome dullness, hebetude, expressionless countenance, tendency to congestion, dilated pupils, and a dusky redness effaced upon pressure, the blood slowly returning. For specific medication purposes the drug should not be given in doses sufficient to produce mydriasis. At the risk of repetition of some of the conditions and to make the belladonna picture more complete, we quote from a former article in the *American Dispensatory:*

The first and great use for belladonna in specific doses is for congestion. It is a prompt remedy in throbbing congestive headache, or nervo-congestive headache; or a dull, heavy headache with a feeling of drowsiness, as if, were it not for the pain, the patient would drop off to sleep. When a dull, dusky or livid condition of the surface showing capillary feebleness and hebetude is threatened in typhoid fever or in pneumonia, belladonna is of the greatest importance as a stimulant, and in the latter assists in sustaining the respiratory function. While it is a remedy for blood-stasis in

any part of the body, due to dilation of the capillaries, it is perhaps more pronounced in its effects when the impairment of the circulation takes place in the nerve centers. It is the first remedy to be used when there is cerebral or medullo-spinal congestion as evidenced by dullness and coma. Though oftenest demanded in acute diseases, it is of equal value in chronic cerebral disorders with dizziness, drowsiness, and dull heavy aching or fullness in the head. When the eye is dull and the pupil dilated, and drowsiness is marked, and there are other signs of congestion that may lead to engorgement of the brain, a threatened attack of apoplexy may be warded off by the timely use of small doses of belladonna.

Belladonna is a remedy for pain and for spasm. It sometimes relieves deep-seated pain, as in facial, intercostal, visceral and sciatic neuralgia. If there is an elevation of temperature, it should be associated with aconite if the circulation is much excited. It is better, however, to relieve spasmodic pain of the involuntary muscles of the tubular organs—spasm of the anus, uterine, cystic, urethral, and other visceral spasms. If any of the parts can be reached it is well to apply the drug locally at the time it is given internally, but care must be had not to overdose the patient. Its value in spasmodic dysmenorrhœa, when otherwise specifically indicated, is unquestionably great.

Belladonna is conceded one of the best of our remedies for whooping-cough. It will fail here unless otherwise specifically indicated. Spasmodic cough alone does not indicate it; there must be the tendency to congestion and the capillary impairment to make it act beneficially. No remedy, probably, cures pertussis, but many shorten its duration, lengthen the intervals between paroxysms, and render it less severe. Belladonna is one of the best for this purpose. When cough is purely nervous and when due to irritability of the tubular musculature it is an important drug. This is shown in its power to relieve nervous cough from laryngeal irritation and in spasmodic asthma.

Belladonna relaxes spasm. It sometimes overcomes constipation in this manner, has served fairly well in spasmodic constriction of the bowels, and has relieved both pain and spasm in lead colic and spasmodic intestinal colic. When epilepsy is associated with congestive symptoms it has assisted other remedies to lessen the severity and lengthen out the intervals of attack. The same is true in chorea. Little dependence can be placed upon it in puerperal convulsions, a condition for which it has been commended.

Few medicines act better in severe sore throat with redness, rawness, swelling, intense soreness, difficult swallowing, and dryness of the throat, with or without fever. Usually aconite is to be given with it. In such conditions it will promptly do good in tonsillitis, especially of the quinsy type, and in pharyngitis and faucitis. If there is an associated coryza it will relieve it, though it acts more promptly in acute coryza when the throat inflammation is absent and it can be given in slightly larger doses than are required for general specific purposes. Many maintain it valuable in diphtheria and believe that it interferes with the formation of the membranes. We question its value for that purpose, though it certainly helps to sustain the breathing and circulatory powers in a disease threatened from the very start with a

depression of these functions. In acute inflammations, such as non-vesicular erysipelas, with deep redness of the skin, capillary impairment, and sense of burning, belladonna should be given with confidence. It acts best where the inflammation is very superficial and does not subsequently extend deeply into the subcutaneous tissues.

The value of belladonna in the exanthemata ranks with the most certain of therapeutic results. It is practically always indicated in scarlet fever and very frequently in measles. Chicken-pox does not so often demand it; while in the congestive stage of small-pox it is claimed to be a most certain aid for many therapeutic purposes. We rely upon it absolutely in scarlatina, and the more malignant the type the more it is indicated. We do not recall a case of scarlet fever in which we have not employed it, and always with the desired effect. Often no other agent has been required. Its use should be begun early. It then brings out the eruption, re-establishes the secretions of the kidneys and bowels, alleviates the distressing throat symptoms, and protects against congestion and subsequent nephritis. The dose must be small, however. If too large it favors congestion. Never more than teaspoonful doses of a dilution of 5 to 10 drops of the specific medicine in four ounces of water should be given every 1 or 2 hours. More often from 2 to 5 drops in the mixture are preferable. It serves much the same purpose in measles, and helps also to control the cough. After the eruption has appeared it is less often demanded in the latter disease, but in scarlet fever it may be needed from start to finish. When one observes the power of belladonna to arouse the patient from a stupid or drowsy state, or even from unconsciousness, or sees it quiet delirium, bring out the eruption, and incite the kidneys to natural action, the power of small doses of powerful medicines becomes convincing even to the most skeptical who believe only in near-toxic or physiological actions of drugs. The action of belladonna in scarlet fever is one of the strong arguments in favor of specific as compared to gross medication. To accomplish desired results without the least danger with a drug capable of great damage constitutes true or specific medication. Belladonna meets many of the complications attending or following scarlet fever, and is probably a preventive of many unpleasant sequelæ. While especially a child's remedy it should be cautiously used. We have observed the scarlatinoid rash from very minute doses of belladonna.

Many physicians believe that minute doses of belladonna are prophylactic against scarlet fever. This view is shared by many good therapeutists, among them Scudder, Fyfe, Ellingwood, and many others. Perhaps it is a matter of faith, but we have never had reason to feel it an established fact. Whether true or not, we do believe, however, that an advantage will have been gained by its early administration should an attack of scarlatina ensue, and certainly it can do no harm if given in infinitesimal doses.

Belladonna stimulates and at the same time relieves the irritability of weakened conditions of the kidneys and bladder. Under its influence both watery and solid constituents are increased. It is the remedy for enuresis in small children when the fault depends upon poor pelvic circulation or chronic irritability of the bladder. It is best adapted to diurnal dribbling of urine. When due to a "cold," and there is marked pallor, and dullness

of the eye so characteristic in children with enuresis, and the patient voids urine every quarter or half hour, belladonna is promptly helpful.

Belladonna is a remedy of power in acute congestion of the kidneys, and in the early or congestive stage of kidney disorders tending to chronicity. It is indicated by the sense of fullness, weight and dragging in the loins. In the early stage of tubular nephritis, and in scarlatinal nephritis, and in fact in renal capillary engorgement accompanying or following any disease, belladonna is a remedy of first importance.

It is one of the best of remedies for polyuria or so-called diabetes insipidus. A belladonna plaster should be applied while giving the remedy internally. Sometimes quite full doses are required to effect results. Full doses are also required to check the colliquative sweating of phthisis pulmonalis and other debilitating diseases, and its well-known quality of causing dryness of the mouth is taken advantage of in mercurial and other forms of salivation, especially the ptyalism of pregnancy.

Spermatorrhœa, with feeble pelvic and genital circulation, is sometimes better treated by belladonna than any other remedy. In such a state pulsatilla is a valuable aid to the belladonna.

It is sometimes effectual in urticaria, especially when sluggish cutaneous circulation is a prominent feature.

BENZOSULPHINIDUM.

Benzosulphinid, Saccharinum, Saccharin, Glusidum, Gluside. (Formula: $C_6H_4COSO_2NH$).

The anhydride of orthosulphamido-benzoic acid prepared from toluene, a coal tar derivative.

Description.—In white crystals or crystalline powder, of an intensely sweet taste, and practically no odor. Its sweetening power is 300 times that of cane sugar. Soluble in water, about 300 parts, more readily in hot water and alcohol, slightly soluble in ether or chloroform, and readily in alkaline hydroxides, ammonia water, and sodium bicarbonate, in the latter with the evolution of carbon dioxide. On account of its more ready solubility the sodium salt is usually employed for general prescribing (see below). *Dose*, 1 to 3 grains.

Preparation.—*Sodii Benzosulphinidum*, Sodium Benzosulphinid—Sodium Saccharin, Soluble Saccharin. The sodium salt of saccharin prepared by neutralizing an aqueous solution of the latter with sodium carbonate or bicarbonate, and slowly crystallizing the product. Colorless, efflorescent crystals or white crystalline powder, odorless or faintly aromatic, and intensely sweet. Very soluble in water (1 1/2) and alcohol (50). *Dose*, 1 to 3 grains.

Action and Therapy.—*External.* Sometimes used as a lotion for aphthæ oris and ozæna.

Internal. An antiseptic used chiefly for its sweetening power, in lieu of sugar, in food and drink for diabetics and the obese, and in other instances where sugar is not permissible. Little effect is observed on the secretions of the body, or the circulation, or nutrition. Saccharin passes from the body unchanged almost wholly by way of the kidneys, where it exerts antiputrefactive powers of value in urinary disorders with purulent urine and in cystitis with ammoniacal urine. It is also effective in fermentative disorders of the stomach and bowels with flatulent distention. The very small quantity required for ordinary sweetening purposes is not likely to act deleteriously, though it has been held to have retarded the secretion of the digestive ferments—ptyalin, pepsin, and trypsin—thus interfering with salivary, stomachic, and pancreatic digestion, when it is given in

amounts exceeding 5 grains a day used persistently. It is not used much as a medicine. Being partially eliminated by the saliva, it is apt to leave a persistently unpleasant taste. Soluble Saccharin is the most convenient for general purposes. Saccharin may also be used to partially mask the taste of quinine, guaiac, and cod-liver oil.

BERBERIS.

The root of *Berberis aquifolium*, Pursh (Nat. Ord. Berberidaceæ). Western United States from Colorado to the Pacific coast; cultivated also for ornament among shrubbery.

Common Names: Oregon Grape, Mountain Grape.

Principal Constituents.—*Berberine*, the yellow alkaloid (see Hydrastis) and two white alkaloids—*berbamine* and *oxyacanthine*.

Preparation.—*Specific Medicine Berberis. Dose*, 1 to 30 drops.

Specific Indications.—Syphilitic dyscrasia; chronic skin diseases, with blood dyscrasia with or without syphilitic taint; profusely secreting tumid mucous membranes; indigestion, with hepatic torpor.

Action and Therapy.—This agent is alterative, tonic, and probably corrective to syphilitic constitutions, but without any proved specific action upon treponema. It stimulates secretion and excretion, improves digestion and assimilation; it activates the lymphatic system and ductless glands; and augments the renal secretion. It is a corrector and eliminator of depraved body fluids and assists thereby in good blood-making. In this way most likely its good effects are produced in such grave constitutional disorders as syphilis. Certainly the ravages of this disease are lessened under these circumstances and aggravated by general ill-conditions. If then syphilitic dyscrasia is benefited by this drug, and clinical results seem to show that it is, it is probably due to its general alterative effects in maintaining good elimination and good metabolic action of the organs vital to nutrition.

Like hydrastis, Berberis aquifolium is an excellent peptic bitter and tonic to the gastric function, and is, therefore, a drug of much value in atonic dyspepsia, with hepatic torpor. Upon the mucosa its effects are like those of hydrastis controlling catarrhal outpouring and erosion of tissue. For this purpose it is useful in stomatitis and gastric and intestinal catarrh. Remotely it sometimes controls leucorrhœa. If these are associated with syphilis, it helps the latter to the extent that it controls these disorders.

Berberis aquifolium has won its reputation chiefly as a remedy for the syphilitic taint. The more chronic the conditions or results of the disease, the more it has been praised. Some claim that if given early it will abort the tertiary stage, but this of course depends in most cases upon the resisting powers of the body and the care the patient takes of himself. Apparently berberis fortifies the resisting powers by its alterative and reparative action. The bone, mucosa, and cutaneous disorders following in the wake of syphilis seem to clear up under its persistent use, when given in appreciable doses. Whether it has any effect on the nervous damage from this taint is not yet apparent. It does, however, relieve the night pains and the shin pain of syphilitic periostitis. Syphilitic phagedena disappears under its use, and sometimes the anemia of syphilis yields to its nutritional improvement. It should be given freely in syphilitic leucoplakia of the

tongue, mouth, and throat, where the mucosa is tumid and secreting excessively, and when emaciation and weakness with yellowish parchment-like skin are evident. At all events, though probably not a direct anti-syphilitic, its general effect upon waste and nutrition is so beneficial that it should invariably be associated with other treatment in chronic syphilitic diathesis.

Other dyscrasiæ seem to be influenced by this drug. It aids to some degree to mitigate the miseries of the consumptive, and in chronic skin diseases its internal use has hastened the effects from external medication. Eczema, psoriasis (temporarily at least), and herpetic eruptions have disappeared under its persistent use. The specific medicine should be given in doses of from 10 to 20 drops well diluted, every 3 or 4 hours.

BERBERIS VULGARIS.

The bark of the root and the berries of *Berberis vulgaris*, Linné (Nat. Ord. Berberidaceæ). Europe, Asia, and the United States.

Common Names: Barberry, Common Barberry.

Principal Constituents.—*Berberine* (see Hydrastis) is the active alkaloid; others are *oxyacanthine* and *berbamine*. The berries contain *malic* acid.

Preparation.—*Tinctura Berberidis Vulgaris*, Tincture of Berberis Vulgaris. (Barberry Bark, ℥viij, Alcohol, 76 per cent, Oj.) *Dose*, 5 to 60 drops.

Action and Therapy.—Barberry may be used for purposes for which berberine medication is needed. It acts much like hydrastis and could be employed for many of the uses of that scarce and high-priced drug so far as the berberine effects are required. The fluid preparations are asserted to act more kindly and more efficiently than berberine itself. It was very early used in domestic medicine for sore eyes, and later by practitioners for chronic catarrhal ophthalmias. The decoction is employed for this purpose, and is equally efficient in aphthous sore mouth. It is decidedly tonic and if pushed, purgative. Used short of its cathartic action it is of value in non-obstructive jaundice and in gastric and intestinal dyspepsia. In renal catarrh, occasioned by the presence of calculi, small doses may be given when there is burning and soreness and excess of mucus in the urinary tract.

BETANAPHTHOL.

Betanaphthol, Naphthol.

A monohydroxyphenol of Naphthalene, a phenol occurring in coal tar but usually prepared artificially from naphthalin. (Formula: $C_{10} H_7 OH$.)

Description.—Permanent, colorless or faintly buff-colored shiny scales, or a crystalline white or yellow-white powder, with sharp taste, and weak phenol-like odor. Soluble freely in alcohol and ether, less so in glycerin or olive oil, and sparingly in cold water, but quite freely in boiling water. *Dose*, 4 to 8 grains.

Action and Therapy.—*External.* Betanaphthol is deodorant, antiseptic, and antifermentative. Either in vapor or solution it is quite irritant, and its injudicious use as a topical agent has produced nephritis. Strong solutions in water or alcohol fissure the skin. A 10 to 15 per cent ointment has proved efficient in scabies, but it acts better when combined with sulphur ointment and balsam of Peru. It is also efficient in pruritus, prurigo, psoriasis, acne, pediculosis, ichthyosis, herpes, and lupus erythematosus when not actively inflamed, but it has proved too irritating

for use in eczemas. A soapy solution has been employed in ozæna with apparent benefit. Weak solutions (5 per cent) have been advised in trachoma and in purulent ophthalmia, but it appears to be extremely irritating and is especially contraindicated where there is ulceration of the cornea.

Internal. Betanaphthol is an intestinal antiseptic, the bismuth salt (bismuth betanaphthol) being usually preferred. About 8 grains is the usual dose, repeated several times a day. Its chief use is to prevent fermentation in diarrhœa, dysentery, gastric and intestinal dyspepsia. As it frequently causes irritation of the stomach it is advised (except in gastric catarrh and gastric dilatation) in keratin-coated pills, so that it will not act until it reaches the intestines. Its tendency to readily cause acute nephritis should be constantly kept in mind, and this circumstance has militated against its becoming popular with Eclectic physicians. It is said to be second only to thymol in value for the destruction of the hook-worm, from 10 to 30 grains being a sufficient daily amount. Naphtalin has been used for similar uses to those of Betanaphthol. It is the commonly used "tar camphor" or "moth balls."

BISMUTHI SUBNITRAS.

Bismuth Subnitrate.

Description.—An odorless and nearly tasteless white powder; though slightly absorbing moisture from the air it is nearly insoluble in water, nor does alcohol dissolve it. Both hydrochloric and nitric acids readily effect its solution. *Dose*, 1 to 15 grains.

Related Salts are Bismuth Betanaphthol (*Dose*, 1 to 15 grains); Bismuth Subcarbonate, Bismuth Subgallate (Dermatol), and Bismuth Subsalicylate, the dose of each ranging from 1 to 15 grains. (See also Liquor Bismuthi.)

Specific Indications.—Elongated, red, pointed tongue, especially reddened at tip and edges; gastric uneasiness, with heat or pain from irritation; pyrosis, with acrid or acid eructations; intestinal irritation, with irritative diarrhœa; nausea and vomiting; gastric ulcer; morbid gastric sensitiveness. *Locally*, a soothing protective.

Action.—The insoluble preparations of bismuth have a feebly metallic taste, and, owing to the formation, it is claimed, of bismuth sulphide, give a blackish coat to the tongue. While the subnitrate acts chiefly as a local agent, it is also somewhat absorbed, for it has been detected in the blood, and in the urine and other secretions. Very likely some of its specific influence is so exerted. The peculiar pasty taste upon the tongue and in the mouth, even after it has been administered in sugar-coated pills so as not to touch the buccal tissues, is further proof that a portion of it at least is absorbed. The chief action, however, is its protective agency upon the mucous linings of the stomach and intestines, allaying irritation by distributing over the surface a practically insoluble coating of unirritating material, and, while not a true astringent, it somewhat restrains the secretions, and acts as an absorbent of excess of acids present. It does not coagulate the gastro-intestinal mucus. Bismuth is excreted by the intestines, and in the urine, and milk, while a portion of it seems to be stored up by the liver.

Upon the unbroken skin bismuth subnitrate has no physiologic effect. In ordinary doses it is practically innocuous. While but slowly absorbed and as slowly excreted when applied to the mucous surfaces and given

internally, it seems to be more readily absorbed from raw or abraded surfaces and in such instances has given rise to severe toxic symptoms. When such absorption occurs in large amounts it occasions aphthous, and sometimes gangrenous, sore mouth, a black discoloration of the mucous surfaces, beginning first around the teeth and extending to all the buccal and faucial membranes, ptyalism, nausea and vomiting, dysphagia, painful intestinal catarrh and diarrhœa, and in some instances desquamative nephritis, with tube casts and albuminous urine. Many of the poisonous effects formerly attributed to bismuth compounds were probably due to the presence of arsenic, and sometimes lead and antimony, that contaminated the European bismuth ores. Those from South America are said to be free from arsenic and now purer salts of bismuth are obtainable.

When given internally in overdoses, subnitrate of bismuth produces unpleasant symptoms, as pain in the stomach, sickness, emesis, derangement of the bowels, giddiness, insensibility, etc., for which the remedies are albuminous and mucilaginous draughts, milk injections, and warm fomentations. These effects are said not to be produced by pure bismuth subnitrate, but have been attributed to the named impurities. It is probable that some such effects are possible from even the pure drug. The long-continued use of the subnitrate of bismuth occasions symptoms of scorbutus. After death from disorders in which bismuth has long been used, a bluish discoloration in portions of the small intestines has been observed, and, owing to the formation of sulphides, the colonic and rectal membranes may be stained black.

Therapy.—*External.* Bismuth subnitrate (or the subcarbonate or subgallate) is a valuable antiseptic dessicant and protective for irritated and inflamed surfaces. It also inhibits the growth of bacteria by absorbing the moisture in which they flourish. It is an excellent dry-dressing for abrasions, excoriations, erythematous patches, and small wounds. Its use in the latter must be guarded, and the quantity small; nor should it ever be used on extensively wounded surfaces. It is the most comforting of applications for the painful excoriations and intertrigo of infants, caused by irritating discharges. It not only soothes but protects from absorption. Oils and fats are useful before excoriation takes place, but afterward are often extremely painful. Petrolatum mixes with the excretions. Bismuth, however, sheds the discharges, protects the parts, soothes the irritability of the skin, and is cleanly. Sometimes the chafed surface may be previously washed with a weak solution of borax or alum, and carefully dried, not by rubbing, but by patting the parts with a soft cloth.

Dusted upon irritables ulcers, bismuth subnitrate gives prompt relief. Applied to aphthæ, nursing sore mouth, and other sores of the mouth due to stomach disorders it gives comfort, and its external use should be accompanied by its internal administration. It is one of the best of dry applications for bedsores, superficial burns, chapped hands and lips, cracked nipples, fissured anus, vesicular eczema and in variola (with carbolic acid). For most of these conditions it may also be used in ointment or glycerinated lotion. For bedsores we have found nothing to excel the following: ℞ Bismuth Subnitrate, Pulverized Camphor, Boric Acid, aa ℥i, Ointment of Rose, and Hydrous Wool Fat aa ℥ij. Mix. Sig.: Apply upon smooth

linen. Ulcers of the septum nasi, after mild cauterization, may be well-dressed with bismuth subnitrate, ℥ij, in glycerin, ℥ij. Locke advised as a cosmetic lotion for rough and pimpled skin: ℞ Bismuth Subnitrate, ℥ij; Glycerin, fl℥ij; Rose Water, fl℥ij. Apply to the face, after carefully cleansing with water and Asepsin Soap.

Internal. Subnitrate of bismuth has a soothing, antiseptic, and subastringent effect upon irritated and inflamed mucous surfaces, making it an ideal remedy in irritative forms of dyspepsia, especially in run-down constitutions, and in acute and chronic gastritis, gastralgia (unless purely neuralgic), pyrosis, and water-brash, especially when due to lactic and butyric fermentation. In gastro-intestinal disorders it is best adapted to states of morbid sensitiveness as shown by the long pointed and red tongue, especially reddened at tip and edges, uneasy sensations with heat in the stomach, or excessive gastric acidity, with nausea, vomiting, or eructations of acid or acrid fluids, and irritative or serous diarrhœa. In these conditions many prefer the Liquor Bismuthi (Solution of Ammonio-Citrate of Bismuth). If the diarrhœa is most largely mucous a purge of castor oil should first be given so that the bismuth salt can the more readily reach the surface of the mucosa. In the gastritis and gastro-intestinal catarrh of young children it is a most valuable drug. One to 3 grains may be given every 3 hours, suspended in water, or mucilage of tragacanth. Acacia should not (as a rule) be used, as it forms a lumpy mass with bismuth.

Bismuth subnitrate is one of the most certain agents in gastric ulcer, both to control pain and to contribute to a cure. It is less valuable in gastrodynia when purely neuralgic than when due to irritation or inflammation. Cancer of the stomach is not cured by this salt, but it gives great comfort in controlling the attendant pain and giving rest. ℞ Bismuth Subnitrate, ℥j to ℥ij; Morphine Sulphate, gr. j. Mix. Ft. Powders, No. 12. Sig.: One powder every 6 hours, or as needed. If to be given with sodium bicarbonate for water-brash and sour stomach the subcarbonate is preferable, on account of the possible distention caused by greater liberation of carbon dioxide through the interaction of the subnitrate and the soda salt. In chronic diarrhœa it is serviceable in doses of 5 to 20 grains every 2 hours; and in the diarrhœa attending typhoid fever and phthisis it may be given in 5-grain doses; sometimes with small doses of magnesium oxide and gum acacia, 3 grains of each. Locke prescribed the following for the chronic diarrhœa of phthisis and general tuberculosis: ℞ Bismuth Subnitrate, ℥j; Cinnamon Water, fl℥ij. Mix. Sig.: One or two teaspoonfuls every 3 hours. A milk diet with 5 grains of this salt was effectual during the Civil War to control the diarrhœa due to exposure so common to camps and military life. Other bismuth salts, as the subgallate, subcarbonate and subsalicylate, have no special advantages over the subnitrate.

Bismuth salts are quite extensively used for diagnosis, by Roentgenography, of the stomach and intestines, usually being administered in buttermilk or soup. Large amounts are necessary and some instances of poisoning have resulted therefrom. Owing to its equal efficiency and cheapness pure barium sulphate has largely supplanted bismuth subnitrate for radiograph work.

The action of the hydrogen sulphide in the bowels, for which bismuth has a great avidity, causes the feces to appear black.

BOLETUS.

The fungus *Polyporus officinalis*, Fries (*Boletus laricis*, Jacquin). (Nat. Ord. Fungi.) Asia, Eastern Europe, and Central America.

Common Names: White Agaric, Purging Agaric, Larch Agaric.

Principal Constituents.—*Agaric Acid* (Agaricin) ($C_{16}H_{30}O_5+H_2O$), resins, 79 per cent and *agaricol*. The purging constituent is a *red resin* ($C_{15}H_{24}O_4$).

Preparation.—*Specific Medicine Boletus. Dose*, 1 2 to 5 drops.

Derivative: *Agaricin. Dose*, 1 10 to 1 3 grain.

Specific Indications.—Ague with alternate chills and flushes of heat; impaired nutrition and feeble cerebral circulation; colliquative sweats.

Action and Therapy.—This fungus is remarkable for the high per cent (79) of resins it contains. It is a decided nerve stimulant and antiperiodic. Boletus is but little used, but occasionally will be needed in irregular intermittents, not reached by quinine medication and presenting alternate chills and flashes of heat, accompanied by a heavy bearing down pain in the back. The patient perspires freely at night and has a yellow-coated tongue, bitter taste, capricious appetite, slight fever, and has for some time been experiencing a dull, languid feeling. It may also be used in cases of impaired nutrition with feeble cerebral circulation. To some extent it controls diarrhœa, cough, hectic fever, rapid circulation, and the profuse night-sweats of phthisis. The dose for these purposes is from the fraction of a drop to 5 drops of the specific medicine. For the last named use—that of controlling colliquative sweating, *agaric acid* or *agaricin*, as it is more commonly called, is one of the most effectual of antihydrotics. In 1/3 grain doses it controls the thirst, cough, and the excessive sweating of consumptives.

BROMUM.

Bromine.

The element Bromine (*Symbol*, Br.).

Description.—A heavy dark, brownish-red, mobile liquid, irrespirable and violently irritating to the eyes and lungs; soluble in water and chloroform, and in ether and alcohol, being slowly decomposed by the latter two.

Action and Toxicology.—Applied to the skin bromine is cauterant and may produce gangrenous ulceration. It is a very violent irritant poison, producing aspiration pneumonia when inhaled and gastro-enteritis when swallowed. As it is almost impossible to swallow it, most toxic cases will be those that inhale it. In internal poisoning the stomach should be washed out and a brisk alkaline purgative given. The gastro-intestinal inflammation should be treated symptomatically.

For poisoning by inhalation the cautious inhalation of ammonia is the antidote. Workmen in bromine keep near at hand bottles of ammonia water to be dashed to the floor and broken in case of accident through the spilling of bromine.

Therapy.—*External.* Used almost wholly upon hospital gangrene, and occasionally in alcoholic dilution (1 to 3) upon cancer of the womb, and sometimes for the destruction of chancre and chancroid. Occasionally, though rarely at the present day, it is inhaled as a deodorant and disinfectant in fetid diphtheria.

BRYONIA.

The root of *Bryonia dioica*, Jacquin, and *Bryonia alba*, Linné. (Nat. Ord. Cucurbitaceæ.) Europe.

Common Names: Bryony, Bastard Turnip, Devil's Turnip, etc.

Principal Constituents.—Probably a colorless, very bitter glucoside, *bryonin* is the chief active body in bryonia.

Preparation.—*Specific Medicine Bryonia. Dose*, 1/20 to 5 drops. *Usual method of administration:* ℞ Specific Medicine Bryonia, gtt. v to x; Water, fl℥iv. Mix. Sig.: One teaspoonful every 1 to 3 hours. The smaller doses are preferred for specific medication.

Specific Indications.—Sharp cutting pain, or tearing pain from serous inflammation; tenderness on pressure; tearing pain with sore feeling in any part of the body and always aggravated by motion; moderately full or hard wiry vibratile pulse; headache from frontal region to occiput; soreness in eyeballs upon movement; hyperæsthesia of scalp or face; irritating, hacking or racking cough or provoked by changes of air; lethargy short of dullness; tired, weary or apathetic feeling, too tired to think; perspiring on slight movement.

Action.—The fresh root of bryonia is a strong irritant, and when bruised and kept in contact with the skin blisters it. When taken internally in overdoses it causes severe gastro-enteritis, and has caused death. The chief symptoms are uncontrollable diarrhœa and vomiting, dizziness, lowered temperature, dilated pupils, cold perspiration, thread-like pulse, colic, and collapse. Large but less than fatal doses sometimes cause bronchial irritation with cough, hepatic tenderness, increased urination with vesical tenesmus, cerebral fullness and congestion, jaundice and depressed action of the heart. These effects are never experienced from the small medicinal doses. Tannin is said to counteract the untoward effects of bryonia.

Therapy.—Bryonia, practically unused in the dominant school, and much employed by Homeopathists, is regarded by Eclectic physicians as an indispensable agent. Personally, we use few agents more frequently than bryonia. It is a remedy for debility and the long train of miseries accompanying it, and in acute diseases it is of first importance as a remedy for pain and inflammation in serous membranes. The bryonia patient is weak and perspires readily upon the slightest movement. The stereotyped assertion, "aggravated by motion," and learned by us from the Homeopaths, is a true dictum when applied to bryonia cases. Though not necessarily dull, the patient is lethargic in the sense that he does not wish to move lest he aggravate his condition. There is no dullness or hebetude as with belladonna, but the patient is tired, languid, and torpid, and though much awake has little inclination to move about.

Bryonia patients, except in the acute infections, often display a deficiency of nervous balance and with this may or may not be associated the bryonia headache—pain from the frontal region to the occipital base; thinking is an effort and the patient is irritable if disturbed. Temperature may be slightly increased, and the tissues contracted. Pressure elicits extreme tenderness and soreness, especially when the viscera are involved.

Bryonia is of especial value in fevers, and is decidedly a remedy for the typhoid state. Many cases of severe typhoid fever may be carried through

with no other medication than bryonia in very small doses. In fact, it is a medicine that gives the best results from minute doses. In fevers the patient is decidedly apathetic, the secretions are scant and vitiated, the nervous system markedly depressed, and the tendency is toward sepsis and delirium. The victim cares little whether he recovers or dies. There is a dry tongue, sordes, a deepened hue of the tissues, capillary circulation is sluggish, and there may be frontal headache. Chilliness is not uncommon, and there is a tendency to sweat easily. In such cases it proves a mainstay during the prolonged fever, and never does the patient harm.

In diseases of the respiratory tract and pleura, bryonia heads the list of useful remedies. The well-known indications given by the founder of specific medication hold good, to-wit: "A hard, vibratile pulse, flushed right cheek, frontal pain extending to the basilar region, and irritative cough." It is a splendid agent for cold in the chest. It is the most decidedly efficient remedy we possess for acute pleurisy, being usually given with, or in alternation with, the indicated special sedative—aconite (quick, small pulse), or veratrum (full, bounding pulse). It promptly meets the sharp, lance-like pain, or the cutting or tearing pain, all made worse upon movement. Not only does it subdue pain, but the temperature is lowered and capillary obstruction is overcome, thus freeing the disordered circulation. After the acute symptoms have subsided, it may be continued alone for a long period, to prevent, or to absorb, effusion. In these cases the apathy observed in the febrile diseases is absent, the pain and circulatory excitation throwing the patient into a condition of nervous excitement, which is quite readily controlled by bryonia. While of great value in all forms of pleurisy, it is particularly valuable in that form that comes on insidiously. In pleuro-pneumonia, it should be given to promote absorption of exuded serum. In la grippe, it is one of the best of remedies, both for the cough and the debility. We use it confidently in pneumonia to control pain, when present; but above all, to allay the harsh, harassing cough. Bryonia is an excellent agent for cough brought on by use of the voice, or by motion of any kind, as walking, swallowing food, entering a warm room, and for that form of cough induced by tickling sensations in the throat, or when excited by vomiting. The cough which bryonia relieves is laryngotracheal; it is most frequently dry, hacking, rasping or explosive, showing its origin in irritation or erethism. Tensive or sharp pains are almost always present, and the secretion, if there is any, is small in quantity and of whitish or brown, frothy mucus, sometimes streaked or clotted with blood. It is one of the most efficient remedies in la grippe, for the cough, pain, and the headache, and in bronchitis, bronchopneumonia, and even phthisis, all with blood-streaked expectoration, it is a great aid in relieving the distressing, hacking cough.

Bryonia is an invaluable agent in the treatment of peritonitis. In peritonitis, from septic causes, as in puerperal peritonitis, it will only aid; a surgical or cleansing process will prepare the way for its use. The pain indicating it is colic-like, attended with marked tensive tenderness. Similar conditions indicate its employment in cholera infantum and typhomalarial fever. In synovitis it is one of the most certain drugs to relieve pain and

remove effusion. Nor should bryonia be neglected in the treatment of pericarditis, in which it will help to control inflammation and to prevent and absorb effusion. Recent reports confirm its earlier reputation as a remedy of the first value in cerebro-spinal meningitis.

Disorders of the liver and gall apparatus frequently call for the small doses of bryonia. It is especially serviceable when there is jaundice, deep orange-colored urine, and soreness upon pressure. There may or may not be an accompanying headache. A peculiarity of the tongue that we have seen bryonia clear up in these cases is a semi-transparent coating of the organ, appearing like a wash of buttermilk. When the liver capsule is involved, with sticking or cutting pain, bryonia will materially help to bring about a healthy condition. The prolonged use of bryonia and aconite in small doses has given us better results in cholecystitis than anything we have ever used, and we believe it has often warded off surgical intervention. Bryonia is a strong aid in the medicinal treatment of appendicitis. In indigestion, where the food lies heavily like a stone, bryonia is often very effective. Scudder valued it for relief of abdominal pain and tenderness in typhomalarial and zymotic fevers, and with ipecac or euphorbia in similar conditions in cholera infantum.

For mammitis, aconite, bryonia and phytolacca are our three best remedies. The first two are to be employed when the inflammation is marked, and the glands are swollen and tender and feel knotted. Phytolacca is always indicated in this trouble. Both bryonia and phytolacca are equally effective in orchitis and ovaritis, with tenderness upon pressure.

Bryonia is a remedy of much value in the treatment of acute rheumatism, being best adapted to those cases where the joints are stiff and swollen. Locke declared it the most certain remedy for rheumatic swelling of the finger joints. As a remedy for headache, bryonia has long enjoyed a well-earned reputation. There is frontal pain (some claim on the right side chiefly), sometimes rheumatoidal; again, it may be from a disordered stomach, or a hemicrania, with sharp, tearing pains and a tender scalp. Occasionally it relieves facial neuralgia, but ordinarily it can not be relied on in that complaint. All bryonia headaches are made worse by motion. Bryonia is sometimes useful in rheumatic iritis, and in partial deafness from pressure of swollen glands after scarlet fever, or from colds. A very true indication for it is soreness of the eyeballs, upon movement, occurring in any acute disorder. The best bryonia preparation is specific medicine bryonia. For all the uses mentioned above, from one to ten drops may be added to a half-glass of water, and of this mixture a teaspoonful may be given every one to two hours.

Finally, but in larger doses than are required for the preceding uses, bryonia (up to drop doses) is one of the best agents to overcome infantile constipation due to difficult digestion of cow's milk and in other forms of constipation, where the stools are dry and scybalous.

In former years, when it was the prevailing belief that insanity was caused by indwelling evil spirits, drastic cathartics were invoked for their removal. In England large doses of a syrup of the fresh juice of bryonia were given. Hence the oft-recurring reference to bryonia in literature as a cathartic—a use to which it is never put in Eclectic Therapy.

BUCHU.

The dried leaves of (1) *Barosma betulina* (Thunberg), Bartling and Wendland, or of (2) *Barosma serratifolia* (Curtis), Willdenow. (Nat. Ord. Rutaceæ.) South Africa. *Dose*, 5 to 60 grains.

Common Names: Buchu; (1) Short Buchu; (2) Long Buchu.

Principal Constituents.—A volatile oil, with a penetrating peppermint-like aroma, yielding *diosphenol* ($C_{14}H_{22}O_3$), or *barosma camphor*, which may be obtained in colorless needles, of a peppermint taste.

Preparation.—*Specific Medicine Barosma. Dose*, 1 to 60 drops.

Specific Indications.—Abnormally acid urine, with constant desire to urinate with but little relief from micturition; vesico-renal irritation, with catarrhal secretion; copious mucous or muco-purulent discharges; cystorrhea.

Action.—Buchu increases the appetite, slightly quickens the circulation, and disinfects the urinary tract. It has but slight effect upon the renal organs, but such as it has is to stimulate slightly the output of both liquids and solids. It acts feebly upon the skin, increasing secretion. Large dose may produce gastro-enteritis and strangury.

Therapy.—Buchu is an aromatic stimulant, tonic, and urinary antiseptic. As a diuretic its action is not pronounced, but it is frequently used with other agents, as citrate or acetate of potassium, digitalis, or spirit of nitrous ether, which make it more efficient for the purposes of renal depuration. Buchu disinfects the urinary tract, imparting its aroma to the urine, and is to be used only in chronic conditions when there is an excess of mucus, or muco-purulent and acid urine, with vesico-renal irritation. Acid and muddy urine, loaded with urinary salts, and continual urging to urinate with but little relief from the effort, are the cases in which buchu renders good service. Under these circumstances it may be given in chronic cystitis, pyelitis, urethritis, prostatitis, lithæmia, and chronic vesical irritation. For catarrh of the bladder it is frequently effective, and in long standing irritation of the viscus, particularly in old persons, "buchu and iron" once a popular fad, is really of service. ℞ Specific Medicine Barosma, fl℥iijss; Tincture of Chloride of Iron, fl℥ss. Mix. Sig.: One teaspoonful 4 times a day in a wineglassful of infusion of hops, or of sweetened water. Occasionally it is used in dyspeptic conditions and in bronchial catarrh, but for these disorders we have far better remedies. Buchu renders the urine dark, the latter depositing a brownish precipitate. It should never be used in acute disorders.

CACTUS.

The fresh, green stems and the flowers of *Cactus grandiflorus*, Linné. (*Cereus grandiflorus*, Miller and DeCandolle.) Native of Mexico and the West Indies; grows also in Italy; cultivated in greenhouses in the United States.

Common Names: Night-blooming Cereus, Large-flowering Cactus, Sweet-scented Cactus.

Principal Constituents.—Cactus has not been satisfactorily analyzed.

Preparation.—*Specific Medicine Cactus. Dose*, 1 to 10 drops.

Specific Indications.—Impaired heart action, whether feeble, irregular, or tumultuous; cardiac disorders with mental depression, præcordial oppression, and apprehension of danger and death; nervous disorders with

feeble heart action; tobacco-heart; hysteria with enfeebled circulation; vertex headache; vaso-motor spasms.

Action.—Cactus impresses the sympathetic nervous system, and is especially active in its power over the cardiac plexus. In sufficiently large doses it acts as an intense irritant to the cardiac ganglia, producing thereby irritability, hyperæsthesia, arrythmia, spasm and neuralgia of the heart, and even carditis and pericarditis. According to E. M. Hale, M.D., it acts upon the circular cardiac fibers, whereas digitalis acts upon all the muscular fibers of the heart. Like the latter, as a secondary effect of over-stimulation, it may induce heart-failure. The tincture, in large doses, produces gastric irritation, and also affects the brain, causing confusion of mind, hallucination, and slight delirium. In excessive doses, a quickened pulse, constrictive headache, or constrictive sensation in the chest, cardiac pain with palpitation, vertigo, dimness of sight, over-sensitiveness to noises, and a disposition to be sad or to imagine evil, are among its many nervous manifestations. Melancholia often follows such action. It is contended by many that the mental, cerebral, gastric, and other effects are secondary to and dependent largely upon the primary effects of the drug upon the heart; others believe its action depends chiefly upon the nervous system.

Therapy.—Cactus is the remedy for enfeeblement of the heart. An old school writer of prominence has said of it that cactus is the only remedy that will quicken a slow heart. While there are some who declare cactus totally inert as a medicine, there are others who claim for it great value even in structural alterations of the heart. The verdict of Eclectic practitioners, who are the largest users of the drug, is that cactus is a remedy chiefly for functional disorders of the heart due to nervous origin. It is, therefore, a nerve remedy primarily and a heart remedy secondarily. Eclectics have also noted that it improves the nutrition of the heart-muscle and thus is, in a measure, a structural remedy also. By improving the nutrition of the organ it is possible, in some instances, to correct structural abnormalities. Valvular troubles have been noted to gradually disappear under its prolonged administration. Unlike digitalis it does not disorder the stomach nor is it cumulative. Cactus acts upon the vessels through the vaso-motor apparatus.

The peculiar state of the nervous system in cardiac diseases, calling for cactus, is quite characteristic. There is a marked mental depression, often amounting to hypochondria and fear of impending death. Associated with these are præcordial weight and oppression and difficult breathing. The control over the nervous system is somewhat like that of pulsatilla, and the effects of cactus are usually permanent.

In medicinal doses, cactus diminishes the frequency of the pulse, and increases the renal secretions, and is, therefore, sedative and diuretic. According to Scudder (*Specific Medication*), it neither increases nor depresses innervation; that it is neither stimulant nor sedative. Locke, on the other hand, believes it sedative, but not depressant (*Syllabus* of *Materia Medica*). In such doses it does not appear to weaken the nervous system in the least.

The special field for cactus is diseases of the heart. Its influence upon the heart is manifested when the disorder is functional; organic conditions are only benefited in a measure. However, some who are antagonists of

Eclectic medicine, who are generally skeptical regarding the virtues of plants which do not possess unusually powerful properties, consider cactus as a valuable agent in mitral regurgitation, due to valvular lesions. In our school, however, let us repeat, it is recognized chiefly as a functional remedy, and one of the best of cardiac tonics. There is no doubt but that the continued use of the drug tends to increase cardiac nutrition and waste, and in this way may benefit cases with structural lesions. The influence of cactus is believed to be exerted almost wholly upon the sympathetic nervous system, through the superior cervical ganglia, expending its force in regulating the action of the heart and controlling the cerebral circulation, thus giving increased nutrition to the brain. It is the remedy for most functional cardiac irregularities, as palpitation, pain, cardiac dyspnœa, intermission in rhthym, etc. Even in structural heart-wrongs, the majority of unpleasant symptoms are partly due to disordered innervation, and this condition is corrected by cactus. It does not seem to make any difference whether the heart-action be feeble, violent, or irregular, provided it be due to lack of innervation, associated with mental depression, or in excitable or nervous individuals, the remedy relieves, because its tendency is to promote normal rhythmic action of the cardiac muscle. Aortic regurgitation is nearly always benefited by it and it is useful in progressive valvular weakness, but is contraindicated in stenotic conditions. In spasm of the heart-muscle, and in cardiac pain of a constrictive character, as if the organ were held with a strong band, it is often the most prompt of all cardiac remedies. It is a good remedy in the heart troubles produced by tobacco, probably benefiting oftener than any other medicine.

Cactus is a valuable remedy for the heart symptoms of neurasthenia. During the menstrual period and at the menopause, nervous women frequently experience unpleasant cardiac disturbances of a functional character. These are relieved by cactus. Few agents excel it in menstrual headache, and headache in women with pressure on top of the head. For nervous menstrual headache, Locke recommends: ℞ Specific Medicine Cactus, gtt. x to xxx; Aquæ, fl℥iv. Mix. Sig.: Dose, a teaspoonful 3 or 4 times a day. When the heart is enfeebled from long illness, as in convalescence from typhoid or other fevers, cactus is invaluable. Even in incurable conditions of the heart it seldom fails to give some relief. It rarely relieves angina pectoris, and neuralgia of the heart, and is sometimes useful in endocarditis and pericarditis following debilitating diseases. The heart-debility induced by overwork, strains, over-enthusiastic athletes, soldiers on the march and "hikers", and that accompanying or following masturbation finds relief in cactus. When associated with cardiac weakness and irregularities, and in so far as they depend upon these conditions, cactus has been found useful in cerebral congestion, mental derangements, irritable bladder, renal congestion, œdematous condition of the limbs, and anasarca. When a vigorous and healthy action of the heart obtains under its use these troubles pass away.

Cactus is recommended in visual defects of an asthenopic character, and in exophthalmic goitre, due to functional heart disease; tinnitus aurium, from the same cause, is benefited by it. These eye and ear disorders are not benefited by it when the cardiac disorder is of an organic nature.

CAFFEA.

The seeds of *Caffea arabica*, Linné (Nat. Ord. Rubiaceæ). Native of Arabia-Felix and Ethiopia; and extensively cultivated in Asia and America between the north and south latitudes of 56°.

Common Name: Coffee.

Principal Constituents.—The chief constituents are *caffeine* ($C_8H_{10}N_4O_2$. H_2O); a volatile aromatic oil; *caffeol* is also present in minute quantity and upon it depends the aroma of coffee; and *caffeo-tannic acid.*

Preparations.—1. *Infusum Caffeæ*, Infusion of Coffee. *Dose*, 2 to 8 fluidounces. 2. *Specific Medicine Coffea. Dose*, 1 to 60 drops.

Specific Indications.—Feeble circulation, with threatened heart-failure; sense of exhaustion; headache, with cerebral hyperæmia or congestion.

Action.—Coffee is a decided cerebral stimulant and energizer. It also increases reflex activity of the spinal cord. Used moderately it is a mild bitter stomachic, stimulating the appetite and facilitating digestion. There is reason to believe that it increases hepatic activity and it promotes peristalsis, thereby favoring a free action of the bowels. Coffee slightly accelerates the circulation. Under its use the intellect is quickened to an extraordinary degree, thinking is facilitated, ideas flow freely, the reasoning faculty is sharpened, and an enormous amount of mental and physical work may be accomplished. The action of hot coffee upon the cerebro-spinal system is especially evident when a person is exhausted by mental strain or physical exertion. Coffee removes drowsiness after a heavy meal, and may produce wakefulness that will last for several hours. If coffee be withheld from one who is accustomed to its stimulus, physical and mental exhaustion become so severe as to interfere with intellectual pursuits or bodily endurance under exertion, and a profound headache may be experienced. Coffee probably retards tissue waste, and is, therefore, a conservator of force.

The excessive use of coffee causes irritability, dejection of spirits, muscular weakness and trembling, watchfulness, dizziness, headache, and ringing noises in the ears; and flatulence, sour stomach with heart-burn and eructations, and disordered action of the bowels. Probably the hepato-gastric symptoms—"coffee biliousness"—is due largely to the empyreumatic oil present in coffee; the nervous symptoms chiefly to the caffeine it contains. Therefore preparations from which the latter has been removed are just as likely to produce stomach disorders as regular coffee.

The stimulating effects of coffee are most largely due to *caffeine*. This alkaloid is one of the most rapidly acting cerebro-spinal stimulants and probably the nearest of any drug to a physiologic energizer of the intellectual brain. It sharpens the intellect wonderfully, and increases particularly the reasoning faculties rather than the imaginative. It operates without after-fatigue and renders the person capable of great mental achievement and physical endurance. Workmen do more work under coffee, and soldiers stand long marches under the stimulus of the caffeine it contains. Large doses produce excitation of the spinal cord, and if carried to full action exaggerate the reflexes, making the person exceedingly nervous. No harm, however, is done to any organ by coffee or by caffeine, and no after-fatigue or exhaustion follows, provided neither be given to the extent of interfering with the taking of food nor of preventing rest or sleep. Caffeine excites muscular contractility, and powerfully stimulates respiration

Upon the circulation it heightens blood pressure and quickens the contraction of the heart. These are accomplished through its action upon the vaso-motor control and upon the heart muscle itself, its effects upon the latter taking origin at the veno-auricular junction, and extending from thence to the auricle and the ventricle. Caffeine increases the output of both the solids and the fluids of the urine, by dilating the renal blood-vessels and by direct action upon the renal epithelia. The tissue-waste of the body is thought to be restrained by caffeine, thus making it a conservator of force and energy. Caffeine is believed to be oxidized and destroyed in the body. The common non-alcoholic beverages of mankind (except coca)—coffee, tea, cocoa, kola, maté and guarana—owe their grateful stimulus to caffeine or related alkaloids. The *theine* of tea is practically caffeine. All of them relieve fatigue, increase mental acuity, endurance and the capacity for exertion without being followed by fatigue or exhaustion.

Therapy.—Coffee in strong infusion is given both by stomach and rectum in opium poisoning. It should be made fresh and as strong as possible. The warmth adds to its efficiency. A cup of strong, hot coffee is often an effectual sobering draught in acute alcoholism. and small and repeated amounts will sometimes ward off an attack of delirium tremens. Coffee is a gratefully refreshing agent for headache due to cerebral hyperæmia or congestion, as shown by red face and injected eyes, but will be likely to aggravate a neuralgic headache when the face is pale. Strong coffee sometimes cuts short an attack of asthma, and checks hiccough. It is the most refreshing stimulant that can be used in the exhaustion of low fevers of a typhoid type and in the debility following other acute disorders, particularly if the patient was previously accustomed to its use as a beverage. In fact, coffee should never be wholly withheld in acute disorders when it has been a factor in the patient's daily dietary. For its stimulating effect in fatigue and nervous exhaustion and calming action in nervous excitation of debility, coffee should be freshly prepared and drunk hot, preferably without sugar or cream; for use in narcotic poisoning very strong, "black coffee" may be given freely, both by mouth and per rectum. (For the uses of Caffeine, see *Caffeina*).

CAFFEINA.

Caffeine, Theine.

(Formula: $C_8 H_{10} N_4 O_2$. $H_2 O$.)

A weak basic principle derived from the seeds of *Caffea arabica*, Linné (Nat. Ord. Rubiaceæ), or from the leaves of *Thea sinensis*, Linné (Nat. Ord. Ternstrœmiaceæ); or synthetically manufactured.

Description.—Fleece-like matted masses of flexible, silky needle crystals, having a glistening appearance, bitter taste and no odor. It loses water of crystallization in dry air; and dissolves readily in chloroform, and less easily in water or alcohol, and sparingly in ether. *Dose*, 1 to 5 grains.

Preparations.—1. *Caffeina Citrata*, Citrated Caffeine (Caffeine Citrate). A white, weakly bitter and acidulous tasting, odorless powder, soluble in water. Should contain nearly half its content of anhydrous caffeine. *Dose*, 1 to 10 grains.

2. *Caffeina Citrata Effervescens*, Effervescent Citrated Caffeine. A white powder effervescing when added to water. Contains about 2 per cent of anhydrous caffeine. *Dose*, 1/2 to 2 drachms.

3. *Caffeinæ Sodio-Benzoas*. Caffeine Sodio-Benzoate. A feebly bitter, odorless white powder, freely soluble in water (separates on standing) and less readily in alcohol. *Dose*, 1 to 10 grains (by mouth); 1 to 3 grains (hypodermatically).

Specific Indications.—Tendency to heart-failure, particularly from shock or surgical operation; sense of exhaustion; headache of congestion or hyperæmia, with red face and injected conjunctivæ.

Action.—For the action of Caffeine, see *Caffea*.

Therapy.—Caffeine is one of the most powerful of cardiac energizers and diuretics. It does not, however, exactly duplicate the action of digitalis, though it is frequently given in place of that agent, or where for one reason or another the latter fails or is contraindicated. Often the one is substituted for the other, though digitalis is the more powerful and better cardiac stimulant. Both together sometimes act better than each singly. When, however, dropsy depends upon cardiac insufficiency, caffeine should be given the preference, and it often succeeds when digitalis fails.

Caffeine is useful in weak and irregular action of the heart. It may be employed when digitalis fails to do the work required of it or when its irritant action upon the stomach is feared. It is much to be preferred when there is myocardial degeneration, and in cardiac insufficiency in pneumonia, la grippe, and other acute infectious diseases. In acute pulmonary edema it is one of the best of drugs; it should be given hypodermatically, preferably in the form of the Sodio-benzoate.

Caffeine is a most important remedy for dropsy of cardiac origin, provided there is no marked renal irritation and the kidneys are capable of functionating. Its value as a diuretic is due to the fact that it acts not only upon the circulation, but chiefly upon the epithelia of the secreting tubules. It should not, however, be used in any form of acute nephritis. In chronic parenchymatous nephritis it often succeeds in causing diuresis when digitalis and other diuretics fail. In chronic interstitial nephritis it should be used when the right ventricle dilates, the urine decreases, shortness of breathing develops, and dropsy appears. It must be remembered, however, that in using it in renal dropsy that it or any other agent can only be useful so far as there are undestroyed cells to functionate, and that it will help just so far as the active cells can be stimulated to increased action. Such an obstacle is not encountered in uncomplicated renal dropsy where only passive congestion of the epithelia is present. The diuretic effects of caffeine require smaller doses than are necessary to produce its cerebral and cardiac effects.

Caffeine alone or with acetanilid or phenacetin, or with bromides, is frequently employed for the relief of migraine or idiopathic headache, when there is cerebral hyperæmia as shown by red face and injected conjunctivæ. It usually aggravates neuralgic headache due to cerebral anemia, with pale countenance.

Caffeinæ Sodio-Benzoas or Caffeine Sodio-Benzoate. This is a mixture of equal parts of caffeine and of sodium benzoate, and is designed especially for hypodermatic use, as caffeine alone can not be so employed. It is freely soluble in water. It is especially useful in weak heart action following operations, and when the pulse is rapid and feeble and the urinary output is so scant as to amount almost to anuria. The dose per mouth is preferably from 1 to 2 grains; hypodermatically, 1 grain.

Caffeine Sodio-Salicylate is also used hypodermatically. Dose, 1 to 2 grains.

CALAMUS.

The rhizome of *Acorus Calamus*, Linné (Nat. Ord. Aroideæ). Common in wet and muddy grounds everywhere in the Northern Hemisphere. *Dose*, 5 to 40 grains.

Common Name: Sweet-flag.

Principal Constituents.—Resin, aromatic essential oil, and a bitter glucoside, *acorin* ($C_{36}H_{60}O_6$).

Preparations.—1. *Specific Medicine Calamus. Dose*, 5 to 30 drops.
2. *Syrupus Calami*, Syrup of Calamus. *Dose*, 30 to 60 drops.

Action and Therapy.—Carminative, sialagogue, excitant, and slightly tonic. Useful as "breath perfume," and in flatulent colic, atonic dyspepsia, feebleness of the digestive organs; and in the form of syrup as an agreeable vehicle for less pleasant medicines. The fresh root shaved thin, transversely, may be candied by boiling in syrup, draining, and allowing it to dry. In this form it is a delicious confection. Calamus may also be given in the form of a syrup or by adding the specific medicine to the required amount of simple syrup.

CALCII BROMIDUM.

Calcium Bromide. (Formula: $CaBr_2$.)

Description.—A very deliquescent, odorless, granular, white salt, of a sharp salt-like taste. Very soluble in water and alcohol. It should be kept in well closed containers. *Dose*, 5 to 30 grains.

Specific Indications.—Insomnia with or without nervous irritability; sleeplessness due to cerebral congestion; anemia; nervous debility from malnutrition.

Action and Therapy.—This agent is sedative and hypnotic, and is said to act with more promptness and without the depression and production of skin blemishes caused by the corresponding potassium salt. It is adapted to anemic individuals with or without determination of blood to the brain when nervousness and sleeplessness result from worry, close application to business, or to hysteria. In 1/2 grain doses it is a good hypnotic for irritable children. It is sometimes a good remedy in congestive headache. It also may be given with advantage to anemic children, administering it in syrup of lactophosphate of calcium.

CALCII CHLORIDUM.

Calcium Chloride.

A hydrated form of Calcium chloride, containing at least 75 per cent of pure $CaCl_2$.

Description.—Odorless, very deliquescent, white or slightly translucent fragments, granules or sticks. Very soluble in hot and cold water, and less so in alcohol. *Dose*, 5 to 15 grains (average, 8 grains).

Specific Indications.—Lymphatic glandular enlargements; slow inflammations, with cacoplastic deposits; bad breath, with dirty, pasty coat on tongue (Scudder); dyspepsia of scrofulous children, with enlarged tonsils, bad breath, irregular bowel movements, capricious appetite, and restlessness in sleep.

Action.—In large doses calcium chloride is a decided poison, causing nausea, vomiting, and sometimes purging, quickened pulse, præcordial anxiety, faintness, muscular weakness, tremor and vertigo. Toxic doses powerfully impress the nervous system, producing tremors, contracted pulse, spasms, paralysis, unconsciousness, and death.

Therapy.—When given carefully in doses not sufficient to irritate the stomach this agent promotes secretion from the skin, mucous surfaces and kidneys, and may be exhibited in disorders of scrofulous children, who are often near-tubercular, to fulfill the specific indications as given on page 259. In adults a dose of twenty grains in aromatized water, an hour after meals, is said to be effectual in controlling general itching. Even moderate doses occasion thirst; therefore it should be given well diluted. Persistent dull headache in lymphatic listless patients, with poorly coagulable blood, is reported to have been relieved by it.

Calcium chloride is a decided blood coagulant and as such is much used at present, and with good results upon those who bleed easily. When bleeders or hemophiliacs or those suffering from purpura are capable of absorbing the agent, it may assist in controlling the hemorrhage. In the large majority of cases of hemophilia and purpura, however, it fails to make any impression. Its use must be intermittent upon those disposed to bleeding, as in hemorrhoids, giving the agent for several doses, then discontinuing for a week, and then resuming its administration, for too continuous use favors decrease of coagulability. It also relieves urticaria when induced by too free indulgence in acid fruits. In so-called cyclic functional or physiologic albuminuria, when albumen escapes from the blood, yet there is no renal structural involvement, calcium chloride seems to offer both diagnostic and curative advantages. It has no effect upon the albuminuria of chronic nephritis. When calcium chloride is not tolerated by the stomach, or is evidently not absorbed, its use may be replaced by *Calcium Lactate*. The latter (1 to 30 of water) but not the chloride (which is too irritant) may also be used hypodermatically.

CALCII HYPOPHOSPHIS.

Calcium Hypophosphite.
(Formula: $Ca\ (P\ H_2\ O_2)_2$).

Description.—Permanent colorless scales, crystals or a powder, without odor, but having a nauseous, bitter taste. It is readily soluble in water, but not in alcohol. *Dose*, 2 to 10 grains, 2 or 3 times a day.

Action and Therapy.—Probably an alterative and restorative. Scudder and others believed this remedy one of value in depression of the nervous system in chronic diseases. It tones digestion, relieves atony and irritation of the respiratory organs, checks cough, and improves respiration, blood making, and nutrition. It is very largely used in the compound syrup of the hypophosphites in scrofulosis and tuberculosis of the lungs. It is a more rational drug in pretubercular conditions than in established phthisis. It is also useful where there are unhealthy deposits in the cellular tissues causing slight inflammations.

CALCII IODIDUM.

Calcium Iodide. Iodide of Lime.
(Formula: $Ca\ I_2$).

Description.—Very deliquescent, pearly lamellæ, or a powder of a yellowish-white color. It decomposes readily and must be kept in closed containers. *Dose*, 1 to 3 grains.

Action and Therapy.—Iodide of Calcium arrests putrefaction and deodorizes the stools. It acts chiefly upon the glandular system and is deemed especially serviceable in cervical adenopathies, and in enlargements of the bronchial glands, giving rise to persistent cough. In the chronic bronchitis of scrofulous children it has been given in 1 to 3 grain doses (or in 1x, 2x, or 3x trit.) with asserted success. A dark-colored or brown "iodide of lime" has been used very largely as a remedy for croup

CALCII PHOSPHAS PRÆCIPITATUS.

Precipitated Calcium Phosphate, Bone Phosphate.

(Formula: $Ca_3 (PO_4)_2$).

Description.—A light amorphous, white, odorless and tasteless powder; almost insoluble in cold water and decomposed by boiling water. *Dose*, 1 to 30 grains.

Preparation.—*Syrupus Calcii Lactophosphatis*, Syrup of Calcium Lactophosphate. *Dose*, 1 to 4 f℥.

Action and Therapy.—Calcium phosphate has been given in states of malnutrition of bone and in tardy union of fractures on the theoretical inference that it will supply the needed calcium to be used in bone construction. It probably has little action in this respect. However, some have declared it valuable in malnutrition of the osseous, dental, and connective tissues, and speak of its good results in anemia, strumous disorders, rickets, profuse discharges, leucorrhœa, and the debility following childbearing. A syrup of calcium phosphate has been used as a chemical food.

Syrup of Lactophosphate of Calcium is a reconstructive for use in cases of general and nervous debility. It was one of the few remedies valued by Howe, who used it largely as a vehicle for Fowler's solution, in tuberculosis of the lungs, and strumous disorders in general.

Calcium Lactate is sometimes employed for calcium medication, in doses of from 1 to 15 grains.

Calcium Glycerophosphate is a nerve reconstructive, and is given in doses of 1 to 8 grains. It dissolves in water and is almost tasteless.

CALCII SULPHAS EXSICCATUS.

Dried Calcium Sulphate, Plaster of Paris.

A powder prepared from native gypsum by carefully heating until about three-fourths of its water has been expelled.

Description.—A fine white powder without taste or odor. When mixed with half its weight of water it forms a smooth cohesive paste which rapidly hardens.

Uses.—Plaster of Paris is used in the preparation of plaster bandages to be applied as an immovable surgical dressing and of molds for the preparation of casts and models. Plaster bandages are applied to fractured limbs and ribs, and to limit mobility in spinal deformities. Many object to plaster dressings for fractures on the ground that the parts are so concealed as to prevent frequent inspection, and that shortening, strangulation, and other accidents may happen if unskillfully applied. By applying them in sections, however, they can be removed, or at least opened, and thus allow inspection if so desired.

CALCII SULPHIDUM CRUDUM

Calx Sulphurata, Sulphurated Lime, Crude Calcium Sulphide, Hepar Sulphuris Calcareum, Hepar Calcis, Hepar Sulphur.

A mixture of at least 55 per cent of Calcium monosulphide (Ca S), together with unchanged Calcium Sulphate ($CaSO_4$) and carbon in varying proportions.

Description.—A pale-gray or yellowish powder, having a nauseous alkaline taste and a faint odor of hydrogen sulphide, and gradually decomposing upon exposure to the air. Slightly soluble in cold water, and more soluble but slightly decomposed by boiling water; insoluble in alcohol. *Dose*, 1/20 grain to 2 grains.

Preparation.—*Trituratio Calx Sulphuratæ* (2x), Trituration of Sulphurated Lime (2x). *Dose*, 2 to 5 grains.

Specific Indications.—Inflammation of cellular or connective tissue with tendency to suppuration; or to hasten the latter when established in order to save extensive tissue infiltration or destruction; successive crops of boils or styes; lymphatic torpor, with tendency to form pus; feeble recuperative powers after exhaustive purulent discharges; scrofulous subjects with tendency to purulent destruction of the lymph nodes.

Action and Therapy.—Hepar sulphur is antipyic and alterative. It is valued for its power over cellular and cutaneous inflammations, with suppuration or tendency to suppurate. If used early it aborts suppuration in boils and adenitis of non-syphilitic type. If not used until suppuration begins it hastens the process. It is one of the best agents in recurrent furuncles of the aural canal, and before or after suppuration in acute otitis media. Foltz valued it highly in ciliary blepharitis, purulent affections of the cornea, conjunctiva, and deeper structures of the eye, in dacryocystitis and in crops of styes. The more scrofulous the subject, the better hepar sulphur acts.

Calx sulphurata is a valuable agent in purulent bronchitis and for the pus-bearing expectoration sometimes following pneumonia, especially where small areas of pus infection linger long after the active phase of the disease has passed. For repeated colds in catarrhal subjects, with heavy and purulent discharges, and in leucorrhœa of a similar type, this agent should be given in small and repeated doses. For chronic skin diseases, showing purulent destruction, with oft recurring pimples, it is a very useful drug. It sometimes cures acne, but more often aggravates it; and it has some effect in eczemas that take on a pustular character. The dose should be small in instances in which this drug is to be used for specific purposes, for large doses often produce some of the conditions sought to be cured by it. While exceedingly effective in many cases, it often signally fails in others appearing to be of exactly the same type as those benefited.

CALENDULA.

The florets of *Calendula officinalis*, Linné (Nat. Ord. Compositæ). Southern Europe and the Orient; largely cultivated as a garden flower. *Dose*, 1 to 60 grains.

Common Names: Marigold, Garden Marigold, Marygold.

Principal Constituent.—A tasteless yellow body, *calendulin*.

Preparations.—1. *Specific Medicine Calendula. Dose*, 1 to 60 drops. For local use, from full strength to 10 per cent aqueous solutions.

2. *Borated Calendula* (Boric Acid, ℥j; Specific Medicine Calendula, fl℥j. Mix). Freely as a dusting powder.

Action and Therapy.—*External.* Calendula is believed to stimulate vaso-motor contraction and selectively to influence the skin and mucous

tissues. After the manner of using arnica it is employed largely as a vulnerary. It is non-irritating and non-poisonous. Its advocates claim that it reduces the probability of gangrene occurring, prevents or lessens the formation of pus, and promotes the prompt healing of wounds, with the least possible cicatrization. It has been applied after the removal of epitheliomata with asserted benefit, and as an application to gangrenous and indolent ulcers, with capillary impairment, it is said to have stimulated replacement by healthy tissues. A wash (1 part of Specific Medicine Calendula to 4 parts of sterile water) has been advised as very effective to promote reconstruction or to reduce tumefaction and discharges, as indicated, in abscess cavities, burns and scalds (to lessen scarring), acne, ulcerative skin diseases, vaginitis, cervicitis, endometritis, vaginal abrasions, erosion of the os uteri, non-specific urethritis, gonorrhœa, leucorrhœa, lacerated perineum, and uterine subinvolution. As a rule, in most of these disorders, its internal use has been advised at the time of using it locally. Ecchymoses are reputed to have been quickly removed by it, and it is claimed that it opposes varicoses. Diluted with rose water to suit the purpose, it may be employed in mild conjunctivitis and in some aural inflammations. In purulent otitis media the borated calendula is preferred. The powder should be lightly insufflated but not packed into the canal, so as to insure free drainage. Borated Calendula may be dusted upon excoriations and sore nipples; and an oil solution of calendula (Calendula, fl℥j or fl℥ij to Liquid Petrolatum, fl℥j) may be sprayed into the nose for the relief of nasal catarrh, with raw and tender membranes, or irritable throat. Thomas cured an inveterate case of crural ulcer in an old man by the use of zinc oxide ointment into which was incorporated Specific Medicine Calendula. Zinc ointment alone failed to achieve results.

Internal. Through its supposed action as a local and general vasomotor stimulant it has been advised internally to reinforce its local action, particularly in old ulcers, varicose veins, capillary engorgement of tissues, and chronic suppurative and catarrhal conditions. Splenic and hepatic congestion are said to have been benefited by it. While of unquestioned value in all of the local conditions named it has been much overrated, and its real medicinal worth obscured by extravagant praise.

CALUMBA.

The root of *Jateorhiza palmata* (Lamarck), Miers (Nat. Ord. Menispermaceæ). A climbing perennial, the Kalumb of the Southeast coast of Africa. *Dose*, 1 to 30 grains.

Common Names: Columbo, Colombo, Columba.

Principal Constituents.—Calumbin ($C_{42}H_{44}O_{14}$), a bitter principle, *berberine* ($C_{20}H_{17}NO_4$) with columbic acid, and columbine, a possible white alkaloid, may be present. No tannin is present.

Preparations.—1. *Infusum Calumbæ*, Infusion of Calumba. *Dose*, 1 to 2 fluidounces.

2. *Specific Medicine Calumba. Dose*, 5 to 30 minims.

Specific Indications.—Enfeebled stomach with indigestion, or feeble digestion; anorexia and debility.

Action.—This is a type of the pure, simple bitters which contain practically no oil or tannin, are not astringent and have no general effect, but act reflexly upon the stomachic and salivary functions by first irritating the mucous membrane and taste buds of the tongue. This action is quite

transitory, so that in administering bitters they should be given immediately before meals. Their effect upon the stomach is to increase local circulatory dilation, a freer flow of gastric juice, increase of mucus, and increased muscular action. On account of the action upon the flow of mucus they should not be administered for too long a period lest gastric irritability and consequent impaired digestion result.

Therapy.—The least irritating and one of the best of the simple bitters and of especial value in atony of the stomach with poor appetite and feeble digestion. It is especially valuable in convalescence from acute fevers and other disorders in which there is lack of desire for food and poor digestion, with pain or without pain, immediately upon eating. After the active stage of cholera morbus, cholera infantum, acute diarrhœa, and dysentery it may be given to promote the appetite and digestion. When desired calumba may be combined with magnesia, bicarbonate of soda, senna, ginger, and aromatics, to meet special indications, particularly when flatulence and constipation are present.

Calumba and the allied bitters should not be given in acute or subacute inflammatory conditions of the stomach, nor during acute fevers, nor when digestion is merely impaired, but the appetite remains good. It is largely ineffectual also when organic disease of the stomach prevents the normal outflow of gastric juice. When given, the small doses are preferable to large ones; and on account of the absence of tannin, iron salts may be given with calumba, if so desired. In some respects calumba resembles hydrastis in its local action, and indirectly, by favoring better digestion, the quality of the blood is improved, hence its value in anemia during convalescence.

CALX.

Lime, Caustic Lime, Quick Lime, Burned Lime, Calcium Monoxide.

Lime prepared by burning white marble or the purest varieties of native calcium carbonate (Formula: Ca O).

Description.—Hard white or grayish-white masses, granules, or white powder, gradually attracting moisture and carbon dioxide from the air and falling to a white powder (slaked lime); of a sharp caustic taste, but without odor. Sparingly soluble (over 800) in cold water and about half as soluble in hot water; insoluble in alcohol.

Preparations.—1. *Liquor Calcis.* Solution of Calcium Hydroxide (Lime Water, Aqua Calcis). *Dose*, f℥j to f℥j.

2. *Linimentum Calcis.* Lime Liniment (Carron Oil). Equal volumes of Lime Water and Linseed Oil, mixed, when needed, by agitation. To be applied liberally.

Specific Indications.—Infantile stomach and bowel disorders, with green stools and vomiting of sour, curdled milk; indigestion from food decomposition and lactic acid fermentation; cellular inflammation, with pus; crops of boils.

Action and Therapy.—*External.* Lime is a powerful caustic depilator, but is now seldom employed for such purposes. It is a good destroyer of noxious material, and may be thrown into vaults, cellars, drains, and similar places to arrest putrefaction.

A milk of lime (lime made into a thin paste with water) is a cheap and effective deodorant and disinfectant of the feces in infectious diseases. The vapor of slaking lime is sometimes useful in croup.

Lime Water is astringent and styptic, but not caustic. It has been applied to a variety of skin disorders, but has little value for such a purpose.

As a topical application in diphtheria it may have a feeble disinfectant action. It is sometimes useful, added to the douche, for acid leucorrhœa.

Lime Liniment, better known as *Carron Oil*, is probably the best immediate application for burns, and particularly for extensive burns and scalds. It is a freshly-prepared, calcareous soap and may be poured freely upon the burned surface and covered with bandages and a layer of cotton to exclude the air. After the smarting has ceased it should be removed and other indicated dressings applied. No application for burns is so safe and satisfactory as Carron Oil, except, possibly, the lately introduced use of paraffin coatings.

Internal. Lime water is antacid, and exerts some astringent action upon the mucosa of the stomach and bowels. It is used largely to prevent changes in milk in infant feeding, often being plied without rhyme or reason. When really indicated, however, it is efficient in preventing lactic fermentation, pyrosis, and sour fecal evacuations. Vomiting, during artificial feeding, is often relieved by adding lime water to the food, and in infantile dyspepsia with the passage of green sour stools, and the child vomiting curdled milk, it is of great value. It is also useful in thrush, though less valuable than sodium bicarbonate. When bottle-fed babies have acid diarrhœa, lime water sometimes checks it.

Lime water often allays irritability of the stomach, with sour belching and nausea and vomiting, in tuberculosis and in fermentative dyspepsia. It may be given in milk, or diluted with water. It also relieves the copious diarrhœa that sometimes attends these diseases.

Lime water has a specific action upon the subcutaneous tissues and is of great value in successive crops of boils and other cellular inflammations with tendency to suppuration. It should form a part of the treatment of acne when due to faulty nutrition or to gastric disorders with lactic fermentation from the decomposition of food. Lime water is a good and useful medicine, but often abusively employed, and without regard to specific action.

CALX CHLORINATA.

Chlorinated Lime, Calx Chlorata, Chloride of Lime (improperly), Bleaching Powder, Calcium Hypochlorite.

A compound resulting from the interaction of chlorine and calcium hydrate. It should yield not less than 30 per cent of chlorine.

Description.—A granular white or grayish-white powder, exhaling the odor of hypochlorous acid or chlorine, and having a repulsive saline taste. It moistens and gradually decomposes upon exposure to the atmosphere. It is only partially soluble in water and alcohol.

Action and Toxicology.—Applied to the skin chlorinated lime is actively irritant and may act as a feeble caustic. In dilution it is desiccant and counteracts gangrenous tendencies. Large doses, swallowed, cause gastric heat with nausea, vomiting, and purgation. Children sometimes accidentally swallow it when it is left within their reach by washerwomen, by whom it is largely employed for bleaching clothes. The treatment for overdoses of it is that of gastro-intestinal irritation and inflammation.

Therapy.—*External.* This agent, when well diluted, forms an excellent deodorant and antiseptic wash for foul conditions, hyperhidrosus, and unpleasant exhalations. From 20 to 40 grains to the ounce of water provides a good application to fetid sore throat and ulcerated gums, and may

be used to relieve frost-bites. A good and cheap disinfecting deodorant for ulcerating carcinomata may be prepared by dissolving 1/2 ounce of chlorinated lime in 1 pint of water. Chlorinated lime, moistened and placed in saucers in several places in the sick room, is a cleanly deodorant and safe disinfectant. The liberated chlorine reaches every crack and cranny and if there is sufficient moisture in the air it will attack offending micro-organisms. Owing to its bleaching qualities it must not be used upon colored clothing, but may be employed to disinfect bedding and white muslin garments. It may also be added to excreta and sputum before casting them into the public sewers. When used to disinfect rooms it is best to generate the chlorine by adding the chlorinated lime to continuously boiling water, with a little sulphuric acid added to the solution. The room should be tightly closed. Under these circumstances the liberated chlorine is one of the cheapest and best of germicides and is much to be preferred to carbolic acid and similar bodies. Sprinkling chlorinated lime in damp passage-ways and cellars will effectually disinfect them. The chlorine should not be inhaled, lest aspiration pneumonia result.

Internal. Teaspoonful doses every 2 or 3 hours, of from 20 to 40 grains of chlorinated lime in an ounce of water, and sweetened, if desired, may be given as an internal antiseptic where there is bad breath, pallid, dirty tongue, with pasty coating, and lymphatic glandular enlargements and slow inflammations, with cacoplastic deposits; also in inflammation of the cellular tissues, with a tendency to sloughing. Thus it is useful in boils and acne, and gratefully deodorizing in some cases of dysentery and fevers with a typhoid tendency. It proves very useful in fetid diarrhœas when the above indications are observed.

CAMBOGIA.

A gum-resin obtained from *Garcinia Hanburii*, Hooker filius (Nat. Ord. Guttiferæ). Siam, Cochin-China, and Cambodia. *Dose*, 1 to 3 grains.

Common Names: Gamboge, Camboge.

Description.—Grayish, orange-brown, cylindical fragments, without odor and acrid to the taste. In powder it is light yellow. Soluble partially in alcohol.

Principal Constituent.—A purgative resin (*cambogic acid*).

Action and Therapy.—Gamboge is a drastic hydragogue cathartic. It is never used alone, but in pills, with other substances, chiefly where dropsical conditions prevail and it is desired to treat them by purgation. It is exceedingly active and has caused death by gastro-enteritis. Full doses should never be given, but repeated small doses in pills or in alkaline solutions, until results are obtained. Alkalies best counteract its drastic effects.

CAMPHORA.

A stearopten (having the nature of a ketone) derived from *Cinnamomum Camphora* (Linné), Nees et Ebermeier (Nat. Ord. Lauraceæ). China and Japan.

Common Names: Camphor, Laurel Camphor, Gum Camphor (it is not a gum).

Description.—Tough, translucent white lumps or granules, having the pungent taste known as camphoraceous, and an aromatic penetrating odor. It dissolves freely in alcohol, chloroform, ether, and fixed and volatile oils; very slightly in water. Camphor is readily pulverized by triturating it with a few drops of alcohol, chloroform, or ether. *Dose* (by mouth), 1 to 5 grains; (hypodermatically) 1 to 3 grains.

Preparations.—1. *Spiritus Camphoræ* (10 per cent), Spirit of Camphor. *Dose*, 1 to 30 drops.

2. *Aqua Camphoræ*. Camphor Water. *Dose*, 1 to 4 fluidrachms.

3. *Linimentum Camphoræ*. Camphor Liniment (Camphorated Oil) (Composed of Camphor, 200 parts; Cottonseed Oil, 800 parts). *Dose*, 10 to 30 drops. For external use chiefly.

4. *Ceratum Camphoræ*. Camphor Cerate. (Composed of Camphor Liniment, White Wax, White Petrolatum, and Benzoinated Lard.) For external use.

Action.—Camphor causes a local dilation of the capillaries of the skin, producing warmth, redness, and sometimes itching. Slight anæsthesia follows. It causes smarting and hyperæmia of the mucosa, and if applied strong may cause considerable irritation. In this manner it has produced gastric ulceration. In small doses camphor warms the stomach, stimulates secretion, increases peristalsis, and expels flatus. Large doses may induce vomiting. Camphor is readily absorbed, both from application and inhalation. It is largely changed in the body and is eliminated in the urine as campho-glycuronic acid. In moderate doses camphor directly stimulates the heart-muscle, causing slower and stronger contractions and increased arterial pressure, but after large doses the pressure falls. Respiration is slightly stimulated by it, large doses causing slower and deeper breathing. In general it may be said that small doses of camphor stimulate, while large quantities depress, or even paralyze. This is true of all the functions it affects. The action of small doses upon the nervous system is to produce a feeling of slight exhilaration or contentment. Large doses excite the higher cerebral and medullary centers and then paralyze them; poisonous doses occasioning more or less of the following symptoms: œsophageal and gastric pain, vomiting, headache, dizziness, mental confusion, drowsiness, delirium, and stupor; feeble, running, or intermittent pulse, cold skin, cold sweat, and muscular weakness followed by rigidity and epileptiform convulsions, collapse and death. The type of convulsions shows its effects to be chiefly upon the cerebral cortex, though it acts also progressively on the medulla, causing death by respiratory paralysis. Camphor does not affect all persons alike. Some may pass directly into drowsiness, insensibility, and stupor, followed by death. If taken for long periods, even in moderate doses, camphor gives rise to a state of mental confusion. Opium and repeated small doses of alcohol are the best antagonists of the untoward effects of camphor.

Therapy.—*External.* Camphor is stimulant, rubefacient, antipruritic, and feebly antiseptic. Owing to its agreeable odor and pleasant stimulating effects it is largely used, as a powder, in lotions, and ointments, or rubbed up with other solids to produce anodyne and antiseptic liquids. In this manner, when triturated with chloral hydrate, menthol, phenol, thymol, and similar bodies, ideal liquid antiseptics are obtained for use upon wounds, neuralgic and other painful areas.

Powdered camphor is an ingredient of tooth powders and pastes and dusting powders for skin diseases. Alone or with zinc oxide, talc, or precipitated chalk it may be used upon bed-sores with decided relief. Such combinations are valuable in intertrigo, chronic eczema, urticaria, and zoster. Many snuffs contain powdered camphor, and it is useful to stimulate sluggish ulcers. Sprinkled upon the face it is used to control itching and to prevent pitting in small-pox. The spirit is a household embrocation for the

relief of pain and itching, and it is used largely, alone, or in liniments and embrocations, for the relief of pain, stiffness, soreness and swelling, as in myalgia, facial and other neuralgias, and upon rheumatic joints, deep inflammations, chronic indurated glands and other indurations, sprains, contusions, and inflammatory swellings. An ethereal tincture of camphor is said to give relief in erysipelas. Inhaling the spirit, or camphor dropped into hot water, gives relief in nervous headache, and often aborts acute colds, coryza, and influenza, giving respite from the excessive secretion and the accompanying headache. A solution of camphor in liquid petrolatum (usually with menthol) is a popular spray for similar uses, and for laryngitis, pharyngitis, chronic nasal catarrh and hypertrophic rhinitis. The spirit, the liniment, or camphorated oil are favorite applications for tenderness and pain, chilblains, toothache, and acute mastitis: in the latter it tends to suppress the milk. The spirit is in common use as a lotion for headache in nervous individuals with feeble circulation, and tendency to fainting. The oil, by injection, is sometimes effectual in removing seatworms. So-called "camphor-ice" is a soothing, camphorated petrolatum preparation for labial herpes.

Internal. Camphor is used to allay nervous excitement, subdue pain, arrest spasm, and sometimes to induce sleep. It is an important remedy in many disorders of neurotic women and children, being frequently most effective as a nerve sedative, antispasmodic, and carminative in nervous nausea and vomiting, flatulence, hiccough, and tendency to spasms or fainting. It is especially serviceable in palpitation of the heart due to gaseous distention of the stomach, or to nervous irritability. In occipital headache, from mental strain, or overstudy, small doses of camphor, together with the consentaneous use of it locally, frequently give prompt relief.

Camphor taken and inhaled may abort "cold in the head," or alleviate it when established. It checks the sneezing, copious, watery secretions and lachrymation and relieves the nasal and frontal headache. It similarly benefits in the acute coryza of epidemic influenza, or la grippe. As an ingredient of cough mixtures, such as camphorated tincture of opium, it contributes much toward relieving irritation, pain, oversecretion, and the associated nervous unrest. In very small doses it is useful in the bronchitis of the aged, while it helps greatly when depression attends slowly resolving cases of acute capillary bronchitis.

The most important use for camphor is in adynamic depression attending or following exhausting diseases. In typhoid, typhus, and other low forms of fevers and low grades of inflammation, with a quick irritable pulse, great restlessness, tremor, morbid watchfulness, dry skin, low muttering delirium and subsultus tendinum, it is one of the most active stimulating sedatives in the materia medica. Similar conditions sometimes occur in acute infectious diseases, as the exanthemata, in acute endocarditis and particularly in acute lobar pneumonia. For this profound depression 15 drops of a 10 per cent sterile oil or ether solution (both are sold in sealed ampoules) may be used hypodermatically and repeated as needed. The latter is similarly employed in shock and threatened collapse attending surgical operations.

In addition to the above-named preparations, solutions of camphor in alcohol, as well as a thirty per cent camphorated sesame oil, have been

used in shock and collapse, and in lobar pneumonia. Indifferent results attend their use in many instances. In fatal cases, where such stimulation has been attempted, the death throes of the patient seem often to be aggravated. It is a common observation that patients to whom "camphor in oil" has been given, "die hard."

Camphor is largely used, usually with other pain-relieving agents, or with aromatic oils, as cajuput, in serous diarrhœa, cholera morbus, and Asiatic cholera, in all when profoundly depressive. It is also useful (usually with opium, as in the diaphoretic powder, or with morphine, as in Tully powder) for spasmodic dysmenorrhea in nervous women, though the opiate content should not be oft repeated, nor long continued, nor given with the patient's knowledge of its use. Camphor frequently relieves menstrual headache, with great nervous depression. It is also useful to control irritation due to the passing of catheters and the strangury that sometimes results from the use of cantharidal blisters. King believed camphor an antidote to strychnine poisoning, supporting his views by the results he had observed on animals. In combination with bromides, camphor has given relief in the late stages of chordee.

Camphoric Acid, in doses of 15 to 40 grains, preferably in cachet or capsule, given a few hours before bedtime, is one of the most effective drugs for the colliquative night-sweats of phthisis.

CAMPHORA MONOBROMATA.

Monobromated Camphor.

(Formula: [Ortho-monobromcamphor] $C_{10}H_{15}OBr$.).

Description.—A colorless powder, needle crystals or scales, having a mildly camphor-like taste and odor; unalterable in the air, but eventually decomposable if kept in the sunlight. Practically insoluble in water, but readily dissolved by chloroform, ether, or alcohol.

Specific Indications.—Simple insomnia, with or without nervous headache; mental excitement; mild mania; mild delirium; hysteria; infantile convulsions, especially to prevent recurrence.

Action and Therapy.—Camphora monobromata is a nerve sedative acting more like camphor than it does the bromides. It is useful to give rest and quiet mental excitement. It sometimes relieves pain and promotes sleep. It is effective in simple insomnia. The pain relieved by it is mostly that caused by nervousness, and the muscular twitchings those due to the same cause. While useful in convulsions, it is less valuable than chloroform and other anti-convulsives during attacks, but is especially valuable to prevent their recurrence. This is largely the case in the convulsions of dentition and childhood. While it may quell the wild delirium of acute alcoholism, it is not adapted to intense and protracted forms of delirium tremens. It has been successfully used in mild spasms, mild hysteria, headache of hysteria, mild forms of acute mania with great restlessness and slight fever, nervous palpitation of the heart, whooping cough, asthmatic and cardiac dyspnœa, and neuralgic cystitis. Good results have been secured from its use in nymphomania, satyriasis and spermatorrhœa, all with nervous excitability. It relieves simple prostatorrhœa when due to irritation and not to catarrhal cystitis; and is especially effective in chordee and urethral irritation, or fever produced by divulsion, or the passage of instruments into the urethra.

Monobromated camphor sometimes relieves the headache, backache, and restlessness of la grippe, and the pain of lumbago, when associated with marked mental irritability and sometimes slight elevation of temperature.

CANNABIS.

The dried flowering tops of the female plant of *Cannabis sativa*, Linné, or the variety *indica*, Lamarck (Nat. Ord. Moraceæ). Asia, East Indies, and cultivated in other parts of the world, notably in the United States.

Common Names: Guaza, Ganjah, Gunjah, Ganga; Indian Hemp (Cannabis indica) when derived from the Indian plant.

Principal Constituents.—Not well determined. The following have been noted: *Cannabin*, an active brown resin, and *cannabinon*, a soft resin.

Preparation.—*Specific Medicine Cannabis. Dose*, 1/2 to 10 drops.

Specific Indications.—Marked nervous depression; irritation of the genito-urinary tract; burning, frequent micturition; painful micturition, with tenesmus; scalding urine; ardor urinæ; wakefulness in fevers; insomnia, with brief periods of sleep, disturbed by unpleasant dreams; spasmodic and painful conditions, with depression; mental illusions; hallucinations; cerebral anemia from spasm of cerebral vessels; palpitation of the heart, with sharp, stitching pain; and menstrual headache, with great nervous depression.

Action.—The principal seat of action of cannabis is upon the intellectual part of the cerebrum. In many respects its effects parallel those of opium and its chief alkaloid. Without doubt it is the most perfect psychic stimulant known to medicine. Certain Orientals become addicts to it, consuming it in the form they call *haschisch* (whence comes the term assassin), and under its influence many crimes and offenses have been committed, as well as with it. Eastern potentates are said to have dosed their fanatic followers with it. It produces an agreeable semi-delirium taking on the character of a sense of well-being and exhilaration—a state highly coveted by its devotees, who call it loftily "the increaser of pleasure," "the laughter mover," "the cementer of friendship," and "the cause of a reeling gait"—all indicative of its physiologic influence. These haschisch debauches are joyful affairs, and while usually devoid of injurious consequences, may be followed by catalepsy and depressive and maniacal insanity, from which, however, the victim recovers fully in time.

In some respects the effects of cannabis on the nervous system are peculiar. It causes an apparently contradictory, consentaneous stage of stimulation and depression—a state somewhat simulated by morphine. The sensations that follow the effects of cannabis vary greatly with the temperament and the peculiarities of the patient, and with his environment. Almost invariably they are pleasurable. An emotional state of happiness even to ecstacy is experienced, with an endless procession of beautiful visions coming and going, and over which the patient indulges in merriment and even hilarity. So pleasurable becomes his sensations that he may break into boisterous laughter and antics of a ridiculous character, the nature of which he fully comprehends, but is wholly unable to prevent. Gradually passing into a dream-like stage, he talks, volubly, brilliantly, with ever-recurring changes of topic, little coherence of thought, and a perverted judgment. His imagination carries him into ludicrous

ideas and strange actions, he has notions of grandeur and greatness, and moments are exaggerated into æons of time. He lives a "life-time in a minute." Endless phantasms of beauty and delight pass before his distorted mental vision. A singular peculiarity is a state of "double consciousness" or dual personality which possesses him in which he imagines he is both himself and some one else, and he behaves accordingly. He becomes affectionate to the extreme, both to himself and to others, and altogether he is a very happy individual leading a very full and infinitely extended life.

Finally drowsiness overtakes him and he drops into a heavy sleep, which may last for hours, and from which he awakens with no other discomfort than a ravenous hunger. In this last stage the pupils are dilated, muscular power in abeyance, and partial anæsthesia prevails. While the ultimate effects of the drug in some result in tremor, great weakness, loss of appetite and convulsions, no deaths have been known to occur in man from this drug.

The effect upon Caucasians is less pronounced than that described, which is experienced chiefly by Orientals. In the former the stage of exhilaration and phantasmagoric inebriation may be very brief or entirely absent, the patient passing successively through heaviness and numbness of the limbs, heat in the head, giddiness, a pleasurable pricking of the whole body, drowsiness, and deep sleep. With some individuals pressure upon the skin is said to excite a sense of burning, and the subsequent anæsthesia may become so profound that the patient, when standing, is not conscious of contact with the ground.

One young man to whom we administered cannabis amused himself by repeatedly jumping over the foot of his bed, laughing with great glee over his capers.

Therapy.—The therapeutic effects of cannabis vary under different conditions. It stimulates in depression and sedates when there is irritation. It lessens pain—especially spasmodic pain—allays spasm, improves the appetite, causes a feeling of contentment and rest, and produces sleep. If pushed too rapidly or in too large doses, exhilaration of spirits, inebriation with phantasms, illusory delirium, and sometimes strong aphrodisia precede sleep. A peculiarity in many individuals taking cannabis is the voracious appetite induced. The effects of cannabis are far less powerful and less disturbing to the general system than those of opium, and it does not, like the latter, restrain the secretions nor produce itching. If anything the urine is increased by cannabis and constipation does not occur.

The keynote indication for cannabis is marked depression of the nervous system usually with insomnia. Secondly, it allays irritation of the urino-genital tract and relieves pain. For the first condition it is invaluable in more or less painful conditions in which opium seemingly would be indicated, but in which, on account of its tendency to restrain normal secretions, would be inadmissible. In fact, cannabis exerts far less restraining power over the secretions than do most similar anodynes. Besides, it favors good digestion and dispels gloom and foreboding. As a pain reliever it is more potent than as a sleep producer, as for some unknown reason even good qualities of cannabis often fail in insomnia when they

succeed perfectly in blunting pain. As a remedy for pure insomnia without pain it is less valuable than many other hypnotics. It is, however, often useful in the sleeplessness of depressive insanity.

Depressive headache, particularly migraine, is one of the types of pain in which cannabis is exceedingly effective. Its use is often advantageously preceded by gelsemium. These cases are those that come on with much excitability and hyperæmia, followed by depression. It is in the depressive stage that cannabis is useful. Spasmodic neuralgic pains are helped by it. It is particularly indicated in the vague pains of indigestion, in depressive nervous headache, nervous gastralgia, gastric neuralgia, gastric ulcer and carcinoma (in the latter two, when opium disagrees), the pains of irritative diarrhœa, neuralgia of the face, neuralgia of the pelvic viscera, so-called chronic rheumatism, endometritis, subinvolution, after pains, and amenorrhœa, all with nervous depression and despondency. It is sometimes useful in the painful paroxysms of locomotor ataxia and sciatica, but as a rule is not powerful enough to subdue these and the severe cramp colic induced by the passage of calculi, unless given in doses large enough to produce other unpleasant effects. Morphine is by far the better agent for the relief of pain in renal and hepatic colic. Cannabis gives relief in painful and spasmodic dysmenorrhœa, marked by much nervous debility; and it is accredited with having promptly checked functional menorrhagia.

Cannabis is a remedy for convulsive and irritative forms of cough. It is especially comforting in the latter stages of phthisis and for the cough of senility, with senile catarrh. In both instances the cough is harassing, expectoration heavy and difficult, and rest and sleep are disturbed. While effective in whooping cough there are better agents for use in children than cannabis. Cannabis aids in depressive hysteria; quiets excessive movements in paralysis agitans, and in some cases of chorea; and sometimes quiets a palpitating heart. It relieves itching in many skin disorders, and especially the pruritus of the aged.

It is, perhaps, in genito-urinary disorders of a subacute and chronic inflammatory type that the usefulness of cannabis is most strongly displayed. With the properly-selected sedative it meets the wants of a pain reliever and nerve soother in urethritis, whether idiopathic or specific. Gelsemium, aconite, and cannabis are, perhaps, more frequently indicated than other internal agents in acute gonorrhea. Locke invariably prescribed the following: ℞ Specific Medicine Aconite, gtt. x; Specific Medicine Cannabis, Specific Medicine Gelsemium, aa fl℥j; Simple Syrup; Water, ad fl℥iv. Mix. Sig.: One teaspoonful every three hours. This relaxes spasmodic tension, relieves ardor urinæ, reduces fever and inflammation, and does much to prevent chordee, and to control it when present. In chronic nephritis cannabis is useful when there is much pain in the back and when blood is passed in the urine. Cannabis is sometimes useful in spermatorrhœa when accompanied by worry, gloomy foreboding, and general mental and physical depression. Having some aphrodisiac action it may be given with strychnine to restore sexual power lost through excesses, but not when due to organic changes. It is of supreme importance in surgical fever due to the passing of the catheter or bougie, or from operations upon the urethral tract. In chronic cystitis, chronic irritation of the bladder, dysuria,

painful micturition, and strangury, it is a drug of very great value. In all instances a good preparation of cannabis must be used, for a poor quality is worse than useless.

CANTHARIS.

The dried beetles, *Cantharis vesicatoria* (Linné), De Geer. (Ord. Coleoptera.) Southern Europe. *Dose*, 1 grain.

Common Name: Spanish Fly; **Synonym:** Cantharides.

Principal Constituents.—Crystallizable *Cantharidin* ($C_{10}H_{12}O_4$) and a volatile oil are said to be the active or vesicating principles.

Preparations.—1. *Specific Medicine Cantharis. Dose*, 1 to 10 drops.

2. *Ceratum Cantharidis.* Cantharides Cerate. (Blistering Cerate.) Epispastic.

3. *Collodium Cantharidatum.* Cantharidal Collodion, (Blistering Collodion, Vesicating Collodion). Epispastic.

Specific Indications.—Vesical irritation; paresis of the vesical sphincter; dribbling and involuntary expulsion of urine; teasing desire to urinate, accompanied with tenesmus.

Action and Toxicology.—Applied to the skin cantharis first reddens then slowly blisters. Its final action may be so intense as to cause sloughing and gangrene; or by absorption to cause strangury and acute nephritis. Small doses stimulate the excretion of urine; large doses are destructively irritant. The earliest symptom from moderate doses is irritation of the urino-genital tract, with strangury and burning pain. If continued, or the dose is large, blood and albumen appear in the urine. Large doses produce all the intense agonies of a violently destructive gastro-enteritis and acute inflammation of the kidneys and bladder; with final suppression of urine and death from uremia. Intense burning pain, soreness and tenderness of the abdomen, excessive burning thirst, profuse ptyalism, with cadaverous odor of the breath, rapid breathing, small thready pulse, griping and purging, profuse urination followed by suppression, exceedingly painful micturition drop by drop, priapism, violent sexual desire, and seminal emissions are among the awful results of a toxic dose of cantharis. Six (6) grains of powdered cantharides is the smallest amount known to have produced death. Cases of poisoning are almost always confined to those who take cantharis to produce abortion.

There is no known chemical or physiologic antidote to cantharis. Poisoning by it must be treated on general principles, with opiates to control pain. When non-toxic doses have produced strangury it may be relieved by opium and camphor, and large draughts of water.

Therapy.—*External.* As a vesicant cantharis acts kindly as compared with some other agents. It is sometimes used as a derivative in deep-seated inflammation, to absorb inflammatory products, and to relieve local pain, as in intractable neuralgias and persistent headache. In Eclectic therapy the use of blisters is scarcely ever deemed advisable, or even necessary. Certainly they should not be used in states of great debility following grave illness, or the exanthems, nor when renal congestion or inflammation is present. Cantharis has been used in lotions to promote the growth of hair. Howe advised it with bay rum, specific medicine uvedalia, and Fowler's solution, for this purpose. Others have used the cantharidal collodion, painted upon the scalp about every two weeks, to encourage the growth of hair in alopecia circumscripta, with asserted success.

Internal. Cantharis has a limited use in modern specific therapeutics. In very small doses it is a decided stimulating diuretic and special sedative to the bladder. One must be very careful, however, to avoid irritant doses. It is the remedy for vesical irritation, to allay teasing desire to urinate and the tenesmus accompanying it. It is one of the most certain remedies for the day-time enuresis of women, particularly the middle-aged, when due to a paretic condition of the sphincter vesicæ; and in women and children with irritable bladders or weak sphincters, in whom coughing, sneezing, or exertion cause an involuntary expulsion of urine. It is equally effective in men who pass their urine with difficulty or dribbling, and intense scalding heat. In minute doses it may be cautiously used in the late stages of acute desquamative nephritis, where the kidneys are weak and functionate sluggishly, every little exertion seeming to produce an increase of albumen in the urine. It has also been advised for the torpid kidney action in the chronic parenchymatous nephritis of inebriates, in pyelitis, and in chronic cystitis. Used carefully in renal medication it may accomplish great good; but when recklessly employed it is a dangerous medicine, producing or aggravating the very conditions sought to be relieved by it.

Cantharis promotes menstruation in atonic amenorrhœa with marked depression. It also increases the sexual appetite and has been used to strengthen the procreative functions. Old gleet and prostatorrhœa are first awakened and aggravated and then relieved by it. Its internal use has been advised in some chronic skin diseases, such as psoriasis, prurigo, lichen, and eczema; upon what grounds we are not advised.

CAPSELLA.

The freshly dried plant *Capsella Bursa-pastoris*, Moench (Nat. Ord. Cruciferæ). A common weed, native of Europe, but naturalized everywhere.

Common Names: Shepherd's Purse, Shepherd's Sprout.

Principal Constituents.—Resin and a volatile oil.

Preparations.—1. *Specific Medicine Capsella. Dose*, 1 to 60 drops.

2. *Infusum Capsellæ.* Infusion of Capsella, (Fresh herb, ℥j to water Oj). *Dose*, Freely.

Specific Indications.—Passive hemorrhages; irritation of urinary organs with phosphatic deposits; prolonged and oft-recurring menorrhagia with almost colorless flow.

Action and Therapy.—Capsella acts chiefly upon the urinary tract, being a mild stimulating diuretic. The infusion, tincture and specific medicine are all efficient, but the green plant is most active. Owing to its mild astringency it has been employed in hematuria, diarrhœa, bleeding piles, and indigestion and dyspepsia of an atonic type. Slightly stimulant it sometimes aids when simple measures are desired in amenorrhœa. In chronic menorrhagia, with a too long or too frequent and almost colorless flow, it is said to have given positive benefit. Its chief value is to relieve irritative and atonic disorders of the urinary tract, with constant desire to urinate, and especially if associated with phosphatic deposits or passive hemorrhage.

CAPSICUM.

The ripe fruit, dried, of *Capsicum frutescens*, Linné (Nat. Ord. Solanaceæ). Tropical America; also cultivated in most tropical countries. *Dose*, 1 to 2 grains.

Common Names: Cayenne Pepper, Guinea Pepper, Red Pepper, African Chillies, Bird Pepper.

Principal Constituents.—Fixed oil, resin, fats, and the rubefacient and acrid principle *capsaicin* ($C_9H_{14}NO_2$) and a volatile oil, *capsicin*.

Preparations.—1. *Specific Medicine Capsicum*. *Dose*, 1/10 to 2 drops, very largely diluted.

2. *Tinctura Capsici*, Tincture of Capsicum. *Dose*, 1/10 to 10 minims.

3. *Emplastrum Capsici*. Capsicum Plaster (Composed of Oleoresin of Capsicum and Rubber Plaster). Rubefacient.

Specific Indications.—Marked depression and debility, with feeble pulse and repressed secretions; pale membranes with scanty, viscous secretion; tongue dry, harsh, and mouth and salivary secretions suppressed or scanty; atonic dyspepsia of drunkards; alcoholic delirium of the depressive type; congestive chill; colic, with abdominal distention; debility with faulty gastro-intestinal functioning in the aged.

Action.—Locally capsicum is decidedly irritant, causing dermal heat and redness. It does not vesicate, however, unless long and closely applied to the mucosa. The oleoresin is much more active and causes sharp burning pain and may destroy the epidermis.

Capsicum is a pure, energetic and permanent stimulant. In large doses it produces vomiting, purging, pains in the stomach and bowels, gastro-enteritis, giddiness, strangury, and a species of intoxication and enfeeblement of nerve power. Smaller doses give warmth to the stomach and excite a hyperæmic state of the gastric mucosa, with increased secretion and accelerated movement of the musculature of the stomach and bowels. It slightly increases the urine, and is mostly eliminated by the kidneys.

Therapy.—*External.* Tincture of Capsicum is an important topical stimulant, rubefacient and counter-irritant. By its revulsive action it often relieves local pain. Painted upon chilblains it quickly gives relief. The pure tincture alone, or mixed with glycerin or mucilage of acacia, may be used. Applied to an aching tooth it either relieves or aggravates, according to the sensitiveness of the nerve or the degree of inflammation present. We have used it with great satisfaction for pain coursing along the spermatic cord in the lower quadrant of the abdomen. It must not, however, be allowed to come in contact with the tender skin of the scrotum. The tincture has been painted upon the scalp to excite the growth of hair in alopecia. With or without glycerin or mucilage of acacia it may be used to clear up ecchymoses. Dry capsicum in the shoes was one of Scudder's favorite means of warming cold feet. Diluted tincture of capsicum, or capsicum with vinegar, and sometimes with salt, is a common and useful stimulating gargle for sluggish forms of sore throat, and sometimes apparently aborts tonsillitis. Capsicum may be used for many of the revulsant effects required of mustard. It does not blister nor cause strangury when so applied. Either the tincture painted upon the part or the capsicum plaster may give relief to so-called chronic rheumatic pains, and be applied in lumbago, pleurodynia and intercostal neuralgia. A stupe of hot water and capsicum applied to the nape of the neck sometimes relieves the headache of debility.

Internal. Capsicum is a pure stimulant to the heart and circulation, giving increased force and slightly augmented frequency to the pulse. One thoroughly acquainted with the action of capsicum can scarcely comprehend why physicians seek for habit-forming stimulants which do infinite harm when so simple and efficacious and pure a stimulant as capsicum may be had. Used within proper dosage it can scarcely do harm, and generally results in incalculable good. Not merely for temporary purposes is capsicum efficient, but its effects are more or less permanent. Naturally it should be selected for atonic conditions and avoided where irritation or active inflammation is present. Nevertheless, in low grades of inflammation and fever, with sluggish blood current, it is a most efficient and necessary stimulant when given in small doses.

The infusion of capsicum is a simple domestic remedy for acute colds, sore throat and hoarseness. Small doses of the tincture are of the utmost value in debility with deficient gastric action. When the membranes are pale, relaxed or flabby, and secretion is impaired or scanty and viscous, capsicum will do more than any other agent to rectify the condition and prepare the way for the action of other medicines. Even where the tongue is dry and elongated and parched from lack of secretion, and the glands of the mouth are inactive, no agent is superior nor safer than capsicum. It has, therefore, wide usefulness in disease—acute, subacute, or chronic. For chronic gastric catarrh it may be used occasionally, but should not be long continued lest it increase the malady sought to be improved. It is invaluable in some cases of atonic dyspepsia, with deficient secretion. It is often promptly effective in gastric flatulence, and is an agent of great value to prevent the accumulation of gases in both stomach and intestines. A mixture of capsicum, vinegar, and salt will sometimes prove a good antiemetic if given in small doses diluted with cold water.

Capsicum should be largely used in low forms of fever—the more depressed the type the more it is needed. It is then of great advantage to maintain the equilibrium of the secretions and the circulation. Capsicum stimulates the appetite, aids digestion, facilitates peristalsis, and is, therefore, both stimulant and tonic to the gastro-intestinal tract. It thus maintains the integrity of those functions—an important desideratum during fevers and in convalescence therefrom. In grave cases of typhoid fever, with almost complete suppression of natural secretions, we would be at a loss without capsicum. It sometimes checks a congestive chill, and in intermittent fever it aids the action of quinine and other antiperiodics.

Capsicum is of very great value in alcoholic delirium. If secretions are suppressed and food can not be taken, or if sleep can not be induced in delirium tremens, one faces an extremely dangerous and perhaps fatal issue. But if secretions can be re-established and food be retained, sleep is very apt to follow. Then the battle against death is won. For this purpose no agent will accomplish so much as capsicum. It may be given at first in frequent small doses in hot water; then as the stomach responds, in larger doses in a good, strong beef broth. While capsicum is best in subacute forms of delirium tremens and not the violent and boisterous type—it sometimes is needed after the latter to satisfy the craving for stimulants, to overcome the sinking sensations at the pit of the stomach, to prevent

morning nausea and vomiting, to restore tone, and to render the stomach tolerant of food. There is scarcely any danger of giving an overdose of capsicum in dipsomania, as large quantities are swallowed with evident relish and without ill results by confirmed dipsomaniacs. Some cases must have alcohol, but most cases respond to capsicum. Then nux vomica, hydrastis, black haw, hydrochloric acid, and other peptics may follow.

Capsicum is of value in many functional nervous troubles with debility and repressed secretions, and for the aged it is one of the few medicines that should be widely heralded for its power to stimulate and preserve gastric tone and prolong life. In the debility of the young or old, but particularly in old persons, when the body-heat is low, vitality depressed, and reaction sluggish, it is an agent of power for good. Tired, painful muscles, stiffened joints, and relaxation of tissue are common conditions in the elderly that are, in a measure at least, helped by capsicum.

Capsicum in very small doses is said to control irritation and stimulate renal capillary activity in chronic renal congestion. In similar doses it may relieve sluggish hemorrhoids, diarrhœa and dysentery, with tenacious muco-bloody stools, with tenesmus and burning, associated with cramp-like action of the bladder. These cases are usually encountered in individuals with a lax habit of body. For chronic, non-burning hemorrhoids with torpor and constipation, or relaxation, Locke advised ℞ Capsicum, gr. ij; Aloes, gr. 1/4. Mix. Make 1 pill.

Capsicum, internally administered, will frequently check frontal neuralgia, particularly if of malarial origin. It is best to give a few preparatory doses and then follow with quinine associated with it. One of our favorite medicines for masked malarial conditions is an hydrochloric acid solution of quinine with capsicum added.

If called upon to say when capsicum is most valuable, we would limit it to: (a) An agent to re-establish repressed or suppressed secretion; (b) to a medicament for the gastric incompetence of the aged; (c) and to a saving remedy in most cases of acute alcoholism. The dose of capsicum for most purposes need not be large, from the fraction of a drop of a good tincture to ten drops; or the specific medicine not to exceed 2 drops. Only in extreme conditions, as in delirium tremens, are large doses, even in excess of ten drops, required. Fluid preparations of capsicum are to be preferred to powdered capsicum for internal use on account of the rectal discomfort occasioned by the latter. Food for the aged and debilitated may be well fortified with capsicum, and frequently sauces, catsup, and like preparations containing it will be found grateful to such patients.

CARBO LIGNI.

Charcoal prepared by burning soft wood. It must be kept in tightly-closed vessels.

Common Names: Charcoal, Wood Charcoal; **Synonym:** Carbo Vegetabilis.

Description.—A tasteless and odorless non-gritty black powder.

Preparation.—*Trituration of Carbo Vegetabilis* (1 to 100). (Carbo Veg.) *Dose*, 1 to 30 grains.

Specific Indications.—Gaseous fermentation and fetor; pulse feeble; pallid skin with doughy and tumid abdomen; expressionless, pale tongue, with spots of denuded coating; passive hemorrhages, and profuse secretion.

Action and Therapy.—*External.* Absorbent, deodorant and disinfectant, but not antiseptic. It is used very largely to deodorize foul ulcers, carcinomata, and gangrene, possessing the advantage of being an odorless deodorant. It is frequently added to poultices and is an ingredient of some tooth powders. A rectal injection of charcoal has checked hemorrhage from the bowels.

Internal. Its absorbent and deodorant properties make charcoal a splendid agent to absorb putrid gases from the stomach and bowels. It is indicated by offensive breath and disagreeable belching. In acidity of the stomach, gastric distention, nausea and vomiting, sick headache with gaseous belching, fetid diarrhœa, and sometimes in the acid vomiting of pregnancy, charcoal is a most effective agent. It may be combined, plain or aromatized with oil of peppermint, with sodium bicarbonate in acidity of the stomach, with bismuth subnitrate in marked irritation and diarrhœa, with ginger in the flatulence of atony, and with rhubarb or magnesia when constipated. Though supposed to have no general effects on account of not being absorbed, Scudder strongly advocated it for passive hemorrhage, using the second decimal trituration of carbo vegetabilis. His statement is worth recording. "The specific use of charcoal is to arrest hemorrhage from the bowels. It has been used in enema, ʒss to ʒj, finely powdered, to 4 ounces of water, thrown up the rectum. Why this checks it I can not tell; that it does it I have the evidence of my own eyes. For several years I have employed the second decimal trituration as a remedy for *passive hemorrhage* with the most marked benefit. I employ it in threatened hemorrhage during typhoid fever; in menorrhagia, especially when chronic; in prolonged menstruation; the watery discharge that sometimes follows menstruation; hemorrhage from the kidneys; hemorrhage from the lungs; and in some cases of leucocythæmia. A good indication for this remedy is a small pallid tongue with lenticular spots, and with this it may be given in any form of disease." (*Specific Medication.*)

Charcoal, like animal charcoal (*Carbo Animalis*), is sometimes given in alkaloidal poisoning with a view to precipitating and retarding the poison until it can be removed from the stomach. Its effectiveness is doubted. It may also be used in hæmatemesis, and frequent foul discharges from the intestinal tract. The pulse is feeble, the belly-wall tumid and doughy, the tongue expressionless and pale with little coating and lenticular spots, or the coating may lift in patches.

CARDAMOMI SEMEN.

The dried, recently decapsulated fruit of *Elettaria Cardamomum*, White et Maton. (Nat. Ord. Zingiberaceæ.) Mountainous coasts of Malabar. *Dose*, 5 to 60 grains.

Common Names: Cardomom Seeds, Cardamom, Cardamon.

Principal Constituents.—A fragrant camphoraceous bitter volatile oil, composed chiefly of terpenes ($C_{10}H_{16}$).

Preparations.—1. *Specific Medicine Cardamon. Dose*, 10 to 60 drops.

2. *Tinctura Cardamomi Composita.* Compound Tincture of Cardamom (Cardamon, Cinnamon, Caraway, Cochineal, Glycerin, and Alcohol). *Dose*, 30 to 60 drops.

Action and Therapy.—Carminative. All preparations are useful in flatulent colic, and to flavor tinctures, syrups, and other medicines, particularly alkaline mixtures, the compound tincture imparting to these an agreeable taste and color.

CARTHAMUS.

The florets of *Carthamus tinctorius*, Linné (Nat. Ord. Compositæ). Egypt and the Mediterranean countries, but cultivated in Europe and the United States.

Common Names: Safflower, Dyer's Saffron, Bastard Saffron, American Saffron.

Principal Constituents.—Two beautiful coloring principles, *Safflor yellow*, and a red, carthamin or carthamic acid ($C_{14}H_{16}O_7$). The latter is a valuable dye.

Action and Therapy.—Chiefly employed in domestic medicine in hot infusion as an emmenagogue for amenorrhœa due to recent colds; and to determine the eruption in scarlet fever and measles. It is somewhat diaphoretic and laxative, and is little used by physicians.

CARUM.

The fruit of *Carum Carvi*, Linné (Nat. Ord. Umbelliferæ). Europe and Asia and cultivated everywhere. *Dose*, 10 to 60 grains.

Common Names: Caraway, Caraway Seed, Caraway-Fruit.

Principal Constituent.—A volatile oil (*Oleum Cari*).

Preparations.—1. *Oleum Cari*, Oil of Caraway. *Dose*, 1 to 5 drops.
2. *Specific Medicine Caraway. Dose*, 10 to 60 drops.

Action and Therapy. An aromatic carminative and gentle stomachic; both the fruit and the oil are of value in flatulent colic and to flavor medicinal compounds.

CARYOPHYLLUS.

The unexpanded flowers (dried flower-buds) of *Eugenia aromatica* (Linné), O. Kuntze. (*Jambosa Caryophyllus* (Sprengel) Niedenzu). (Nat. Ord. Myrtaceæ.) Cloves Island, Moluccas, and cultivated in Africa, East and West Indies, and Brazil. *Dose*, 5 to 10 grains.

Common Names: Clove, Cloves.

Principal Constituents.—A pungent acrid and aromatic volatile oil (*Oleum Caryophylli*), composed principally of *eugenol* ($C_{10}H_{12}O_2$); *eugenin*, and *caryophyllin*, which is isomeric with camphor.

Preparations.—1. *Oleum Caryophylli*, Oil of Clove. *Dose*, 1 to 5 drops.
2. *Specific Medicine Cloves. Dose*, 1 to 10 drops.

Action.—Irritant to the skin and mucosa, causing redness and burning followed by partial anæsthesia. It is typical of the class of volatile oils, most of which act similarly. It excites the salivary secretions and stimulates digestion by impressing the nerves of smell and taste, dilating the gastric vessels, provoking the flow of gastric juice, and inducing increased peristalsis of both stomach and intestines, thus causing eructations of gas and flatus. The latter is no doubt aided by its decided antiseptic qualities. Like all aromatic oils large doses may provoke gastro-enteritis. Oil of clove modifies the griping effects of many medicines. Eugenol acts similarly to oil of clove.

Therapy.—*External.* Oil of Clove obtunds dental pain and sometimes earache. Used pure or in ointments or liniments it relieves local pain, as in neuralgia, and in chronic eczema it allays itching, and is sometimes added to embrocations to give them an agreeable odor. Diluted with alcohol, it may be used to kill pediculi.

Internal. Oil of clove is carminative and stomachic. It often relieves nausea and vomiting, gastric pain, and flatulent distention of stomach or bowels. When cardiac palpitation and pain depend upon gastric distention, oil of clove frequently relieves it.

Eugenol. Derived from oil of clove and other sources may be given in doses of 1 to 3 minims.

CASCARA SAGRADA.

The dried bark of *Rhamnus Purshiana*, De Candolle (Nat. Ord. Rhamnaceæ). A shrub of Northern Idaho and the Pacific coast. *Dose*, 5 to 30 grains.

Common Names: Sacred Bark, Chittem Bark.

Principal Constituents.—Several resins, a volatile oil, and *cascarin*, a glucoside thought to be identical with *frangulin* obtained from Frangula.

Preparations.—1. *Specific Medicine Cascara. Dose*, 15 to 60 drops.
2. *Extractum Cascaræ Sagradæ*, Extract of Cascara Sagrada. *Dose*, 4 to 8 grains.
3. *Fluidextractum Cascaræ Sagradæ*, Fluidextract of Cascara Sagrada. *Dose*, 10 to 60 minims.
4. *Fluidextractum Cascaræ Sagradæ Aromaticum*, Aromatic Fluidextract of Cascara Sagrada. *Dose*, 10 to 60 minims.

Specific Indications.—Constipation due to neglect or to nervous and muscular atony of the bowels; minor ailments, dependent solely upon constipation, with intestinal atony.

Action and Therapy.—Cascara is a simple and practically non-griping purgative, acting with but little or no prostration and never causing a watery stool. It has, moreover, a tonic action upon the stomach and bowels, and does not produce an after constipation. It is the most popular and most efficient agent for chronic constipation, and may be given for a considerable time without increase of dosage. In fact, the dose may be gradually decreased from day to day often with the result of completely curing the constipation. Cascara is adapted to cases of atony of the intestines. When other simple ailments depend upon constipation they may often be remedied by cascara. It is an efficient purgative in pregnancy, in hemorrhoids with loss of rectal tone, in atonic dyspepsia with costiveness, and in sick headache due to atonic sluggishness of the bowels. Gastric and duodenal catarrh, with jaundice, are often rectified by cascara, and it has given good results in chronic diarrhœa when accompanied by hepatic torpor.

Only preparations of *old* cascara bark are desirable; the fresh bark is emetic and otherwise disturbing. The taste of cascara is extremely bitter. This may be modified to a large degree by the addition of fluidextract of licorice and spirits of anise and sassafras. The aromatic fluidextract is a pleasant preparation and has less of a tendency to cause griping. A good laxative is the following: ℞ Specific Medicine Cascara (or the Fluidextract of Cascara), fl ℥ij; Fluidextract of Licorice, fl ℥ss; Essence of Anise, fl ℥j; Simple Syrup, q. s. fl ℥vj. *Dose*: One half to one teaspoonful at bedtime. If a more profound action is desired a half drachm of Specific Medicine Podophyllum may be added.

CASSIA MARILANDICA.

The leaves of *Cassia marilandica*, Linné (Nat. Ord. Leguminoseæ). An American perennial herb of the eastern half of the United States.

Common Names: American Senna, Wild Senna.

Principal Constituent.—A body resembling *cathartin*, and thought to contain chrysophan.

Preparation.—*Infusum Cassiæ Marilandicæ Compositum*. Compound Infusion of American Senna (Leaves, ℥j; Coriander Seeds, ℥j; Boiling Water, Oj). *Dose*, 4 to 5 fluidounces.

Action and Therapy.—An excellent cathartic that may be used as a substitute for senna.

CASTANEA.

The leaves of *Castanea dentata* (Marshall), Sudworth, collected in September or October while still green (Nat. Ord. Cupuliferæ). Native of Asia Minor, naturalized in Europe and America.

Common Name: Chestnut.

Principal Constituents.—A mucilaginous principle, extracted by hot and cold water, but not by alcohol; an astringent body, a sweet substance, and potassium, calcium, magnesium and iron salts.

Preparations.—1. *Infusum Castaneæ*, Infusion of Castanea. (Leaves, ℥j; Boiling Water, Oj.) *Dose*, fl℥iij to fl℥ij.

2. *Fluidextractum Castaneæ*, Fluid Extract of Castanea. *Dose*, fl℥ss to fl℥ii.

Action and Therapy.—The freshly prepared infusion of the leaves is a remedy for paroxysmal or convulsive cough. For some unexplained reason it is sometimes one of the most effective medicines for whooping cough. In many cases it acts remarkedly well, while in others its effects are not so apparent. It is seldom, however, that it does not do some good. The infusion (which is by far the best preparation) may be sweetened if desired, and given freely to the patient several times a day.

CATALPA.

The bark, pod, and seeds of *Catalpa bignonioides*, Walter. (Nat. Ord. Bignoniaceæ). A tree of the southern United States.

Common Names: Cigar Tree, Bean Tree.

Principal Constituents.—The seeds contain tannin, resin, and fixed oil.

Preparation.—*Specific Medicine Catalpa. Dose*, 1 to 20 drops.

Action and Therapy.—Said to be useful in chronic bronchial affections with dyspnœa and asthma, and in functional heart disorders. Its exact therapy has not been determined.

CATARIA.

The leaves and flowering tops of *Nepeta Cataria* (Nat. Ord. Labiatæ). A common perennial of Europe, and naturalized in the United States.

Common Names: Catnip, Catmint, Catnep.

Principal Constituents.—An aromatic volatile oil and a bitter body.

Preparations.—1. *Infusum Catariæ*, Infusion of Cataria. (Catnip, ℥j to Water, Oj). *Dose, ad libitum.*

2. *Specific Medicine Nepeta. Dose*, 10 to 60 drops.

Specific Indications.—Abdominal colic, with constant flexing of the thighs; writhing and persistent crying; nervous agitation.

Action and Therapy.—A safe and valuable, though simple carminative, diaphoretic (in warm infusion), and tonic (cold infusion). A splendid quieting agent for fretful babies, and carminative and antispasmodic for abdominal pain with flatulence. When marked nervous agitation precedes menstruation in feeble and excitable women and the function is tardy or imperfect, this simple medicine gives great relief. It is especially valuable for the nervous irritability of dyspeptics, nervous headache, atonic amenorrhœa and dysmenorrhœa, and wards off nervous or hysterical attacks. The warm infusion is an admirable remedy to break up "common colds" by diaphoresis, and to determine eruptions to the skin in the exanthemata. If less ridiculed and more used, in place of far less safer remedies, "catnep tea" would be found a very useful medicine for women and children. It

should not be sweetened. Where the added effects of alcohol are needed, or when the freshly dried herb cannot be obtained, the specific medicine may be used in place of the infusion.

CAULOPHYLLUM.

The rhizome and roots of *Caulophyllum thalictroides* (Linné), Michaux (Nat. Ord. Berberidaceæ). In rich woods in the eastern half of the United States.

Common Names: Blue Cohosh, Squaw-root, Pappoose-root.

Principal Constituents.—An indifferent alkaloid *caulophylline* (not to be confused with the resinoid "caulophyllin,") and an active glucoside of the saponin type, *leontin*.

Preparations.—1. *Specific Medicine Caulophyllum. Dose*, 1 to 10 drops.

2. *Leontin* (Lloyd's), a 1 per cent solution of leontin, the emmenagogue principle of caulophyllum. *Dose*, 5 to 15 drops in syrup or sweetened water.

3. *Syrupus Mitchellæ Compositus*, Compound Syrup of Mitchella (Compound Syrup of Partridgeberry). *Dose*, fℨi to fℨiv.

Specific Indications.—Uterine pain with weight and fullness and pains in the legs; sense of pelvic congestion; sluggish labor pains; as a partus præparator.

Action and Therapy.—Caulophyllum was at one time largely used as an antispasmodic, emmenagogue, parturient, diuretic, diaphoretic and expectorant, all of which properties it possesses in greater or less degree, according to its manner of use. It unquestionably acts with some force upon the reproductive organs of women, overcoming pain and tenderness in debilitated subjects. It seems best adapted to uterine debility arising from chronic inflammatory conditions. In many respects it resembles macrotys, both upon the reproductive organs and in controlling rheumatoid pain. For many years it was a favorite remedy for false pains and after-pains. It, like macrotys, facilitates child-birth. Both agents produce contractions most like those of the natural labor process. In this respect they were often used to replace tetanic-acting ergot when that agent was so popular and so damaging as an oxytocic. It may be used to assist labor when delay is due to weakness, fatigue, or lack of uterine power, or when the tissues feel full, as if congested. The skillful use of forceps has largely supplanted drugs of this type, yet there are many cases in which they might still be used with greater safety than forceps. As an ingredient of the Compound Syrup of Mitchella (Mother's Cordial), it is still relied upon by some physicians as a good partus præparator.

Caulophyllum is a good emmenagogue. It may be used where there is congestion with irritation, and the natural functions are badly performed. In troubles dependent upon such irregularities, it has given fair results, though macrotys has supplanted it for most conditions. Metritis, endometritis, amenorrhœa, dysmenorrhœa, ovaralgia, ovaritis, rheumatism of the uterus, menstrual cramps, uterine subinvolution, and spasmodic retention of urine have all been favorably influenced by caulophyllum. It is of some, though minor, value in spasmodic urinary and gastro-intestinal disorders.

Leontin (1 per cent solution of the emmenagogue principle of caulophyllum) has been successfully prescribed for amenorrhœa, dysmenorrhœa, and chlorosis. The dose of leontin is 5 to 15 drops in syrup or sweetened water.

Compound Syrup of Mitchella may be given for weeks as a uterine tonic preceding labor. It seems to have both a real and a psychic influence that will redound to the benefit of the prospective mother. It is also a good uterine tonic for debility and uterine feebleness in the childless, and assists in the recuperation of strength and rapid involution of the womb following labor. The dose of the syrup is from f℥ii to f℥ss, 2 or 3 times a day.

CEANOTHUS.

The root, root-bark, and leaves of *Ceanothus americanus*, Marshall (Nat. Ord. Rhamnaceæ.) A small shrub indigenous to the United States, particularly in its western section, growing in barrens and dry woodlands. *Dose*, 5 to 20 grains.

Common Names: Red Root, New Jersey Tea.

Principal Constituents.—Tannin, a volatile oil, resin, ceanothus-red, and a white alkaloid *ceanothine*.

Preparation.—*Specific Medicine Ceanothus. Dose*, 1 to 20 drops.

Specific Indications.—Sufficiently given below.

Action and Therapy.—Astringent and sedative. This drug is reputed efficient in gastric and hepatic disorders dependent upon splenic enlargement, especially when caused by malarial influence. It has given good results in splenic hypertrophy, with expressionless countenance and sallow, doughy skin; also in splenic congestion and subacute splenitis, the pain of which is not much aggravated by pressure. Other indications for ceanothus are deep-seated splenic pain, with or without splenic enlargement, and sympathetic painful states depending upon spleen pathology; also non-inflammatory catarrhal conditions with abundant secretions. During the American Civil War the decoction was used by the soldiers for "ague cake" or malarial splenitis.

CERA ALBA.

Yellow wax bleached by exposure to air, light, and moisture. (See *Cera Flava.*)

Common Name: White Wax.

Description.—A yellowish-white solid, translucent in thin layers, having an insipid taste and a faint but not rancid odor. It dissolves readily in volatile and fixed oils and fuses with fats and resins.

Preparation.—*Ceratum*, Cerate, (Simple Cerate). (White Wax 3, Benzoinated Lard 7.) (See also Adeps Benzoinatus.)

CERA FLAVA.

A peculiar concrete substance prepared by melting and purifying the honey-comb of the *Apis mellifera*, Linné, or Common Honey Bee.

Common Names: Yellow Wax, Beeswax.

Description.—A yellowish to gray-brown solid, of a honey-like odor and faint balsamic taste. It is brittle when cold and breaks with a granular fracture. Soluble in ether, chloroform and fixed and volatile oils.

Uses.—Both white and yellow wax are principally employed in the making of ointments, cerates, and plasters, to impart to them proper consistence and tenacity.

CERII OXALAS.

Cerium Oxalate.

A mixture of several oxalates of rarer elements.

Description.—A white or pinkish powder, odorless and tasteless, and unaltered by exposure to the air. Insoluble in water, alcohol, or ether. *Dose*, 1 to 10 grains (usual dose 1 to 3 grains every 3 hours.)

Specific Indications.—Nausea and vomiting of pregnancy.

Action and Therapy.—Cerium oxalate is anti-emetic and has been used to allay reflex vomiting of uterine origin, and less effectively in that depending upon simple gastric irritation, or destructive processes going on in the stomach. Its chief reputation rests upon its supposed power to allay the nausea and vomiting of pregnancy, a condition in which it fails more often than it succeeds. It is also given for seasickness with occasional good results. Acting somewhat like bismuth it is effectively employed to allay the gastric irritability due to dyspepsia, phthisis and other wasting diseases. Scudder used it with apparent success in ulcerated cervix uteri and uterine irritation with leucorrhœa, administering the 2x trituration. Webster asserts it (6 grs. every hour) is useful in dysmenorrhœa in robust, fleshy women, with scanty menses, and spasmodic, colicky, or tenesmic pain before or at the beginning of the flow. It is difficult to understand how it can affect the uterine functions, as it is thought to be practically unabsorbed by the stomach.

CEREVISIÆ FERMENTUM.

The ferment obtained in the brewing of beer.

Common Names: Beer Yeast, Brewer's Yeast, Barm.

Description.—A thick, glutinous, foam-like fluid of wine-acid odor, and unpleasant taste. It is a complex mixture of water, alcohol, salts, saccharo-mucilaginous extracts, and the yeast plant, the *Saccharomyces cerevisiæ*. It does not dissolve in, but mixes with water. It is an unstable body, and should be used only when fresh. *Dose*, 1 drachm to 1 ounce.

Therapy.—*External.* Yeast poultices, in combination with elm and charcoal, have been particularly effective as emollient and antiseptic applications to boils and carbuncles, where poultices are at all admissible.

Internal. Yeast, in drachm doses, 3 times a day has been given with unquestioned advantage to those suffering from recurrent crops of boils. It has also been advised in the same or larger dosage, taken immediately before meals, in diabetes mellitus to modify the abnormal production of sugar, or to destroy it. Through ingenious advertising it has recently become popular with the laity as a so-called "vitamine-bearing" substance.

CETACEUM.

A concrete fat-like material obtained from the head of *Physeter macrocephalus*, Linné, the Sperm Whale of the Pacific and Indian Oceans.

Common Name: Spermaceti.

Description.—Partly translucent white masses, somewhat grease-like to the touch, and turning yellow and becoming rancid upon long exposure to the atmosphere. It has scarcely any odor and a mild, bland taste. It dissolves in boiling, but scarcely in cold, alcohol; is insoluble in water; and soluble in ether, chloroform, and oils.

Therapy.—*External.* Emollient. By pulverizing by trituration with a small portion of alcohol it may be used as a dusting powder for the feet and other parts liable to friction. It is an ingredient of many useful ointments and cerates.

Internal. Demulcent. It was once given with sugar and in emulsion for coughs and colds and gastro-intestinal troubles.

CHELIDONIUM.

The whole plant of *Chelidonium majus*, Linné (Nat. Ord. Papaveraceæ). Europe; naturalized in waste places in the United States. *Dose*, 1 to 60 grains.

Common Names: Celandine, Great Celandine, Tetterwort.

Principal Constituents.—*Chelerythrine* (identical with the alkaloid *sanguinarine*), *chelidonine* (stylophorine), and malic and chelidonic acids.

Preparation.—*Specific Medicine Chelidonium. Dose*, 1 to 15 drops.

Specific Indications.—Full, pale, sallow tongue and membranes; skin sallow, sometimes greenish; hepatic congestion; jaundice due to swollen bile ducts; sluggish liver action with light pasty stools; reflex cough from hepatic pain; fullness with tensive or throbbing pain in the right hypochondrium, with dull pain radiating to the right shoulder; melancholia, headache and stomach disorders depending upon imperfect hepatic function.

Action and Therapy.—*External.* The fresh juice of chelidonium applied to the skin produces rubefaction, inflammation and vesication. It will destroy verrucous growths.

Internal. Internally, in full doses chelidonium is a drastic hydragogue purgative, operating much like gamboge. Though reputed to be of some value locally as a stimulant and vulnerary, its present use is confined almost wholly to disorders hinging on imperfect or faulty hepatic function. It also appears to act somewhat upon the spleen, probably including most of those parts of the splanchnic area supplied by the chylopoietic vessels and the branches of the solar plexus.

Chelidonium is one of the best remedies for biliary catarrh resulting from hepatic congestion and for jaundice occasioned by swelling of the bile ducts, as a result of subacute inflammation. The best guide to its use is the tenderness and tensive or throbbing pain of the hypochondrium with dull pains extending to beneath the right shoulder blade. While there is more or less localized pain, there is no general abdominal pain as a rule. The skin and membranes have the usual appearance of hepatic obstruction, the stools are clay-colored, the urine cloudy and pale with rather high specific gravity, or it may be loaded with bile. Sometimes there is œdema of the extremities. Under these conditions we have seen chelidonium clear up distressing conditions and prolong the intervals between attacks of gall-stone colic. In one severe case of gall-stone colic, which was but a repetition of many preceding ones, no other attacks followed the use of chelidonium, the patient being under observation for many years, and occasionally taking a dose of the medicine. It is not a remedy for the paroxysms of hepatic colic, but to prevent or repair the condition upon which they depend.

When hemorrhoids, splenic congestion, dyspepsia, headache, migraine, supra-orbital neuralgias and cough are dependent mostly upon the liver disorders helped by chelidonium, they are proportionately relieved by the action of chelidonium upon the latter. The greatest drawback to chelidonium is its horribly nasty taste.

CHELONE.

The herb, and especially the leaves, of *Chelone glabra*, Linné (Nat. Ord. Scrophulariaceæ). Damp soils in the United States. *Dose*, 5 to 60 grains.

Common Names: Balmony, Snakehead, Turtlebloom, Turtlehead.

Principal Constituents.—An unnamed glucoside and the usual constituents of plants.

Preparation.—*Specific Medicine Chelone. Dose*, 5 to 60 drops.

Action and Therapy.—A useful remedy for gastro-intestinal debility with hepatic torpor or jaundice. Dyspeptic conditions attending convalescence from prostrating fevers are often aided by it, and it should be studied particularly for vague and shifting pain in the region of the ascending colon, attended with persistent uneasiness and sometimes tormina. We have used it for these conditions with satisfaction. The infusion (℥ss to Water, Oj) in small doses, is effective, though disagreeably bitter.

CHENOPODIUM.

The fruit and oil of *Chenopodium ambrosioides anthelminticum*, Linné (Nat. Ord. Chenopodiaceæ). Waste places throughout the United States.

Common Names: American Wormseed, Wormseed.

Principal Constituent.—A volatile oil, *Oleum Chenopodii*.

Preparation.—*Oleum Chenopodii*, Oil of American Wormseed. A colorless or pale yellowish oil with the disagreeable odor and taste of wormseed. *Dose*, 5 to 10 drops.

Specific Indications.—Lumbricoid worms; hook-worm.

Action and Therapy.—A safe and certain vermifuge for the removal of the lumbricoid or round worm (*ascaris lumbricoides*). After proper preparation, by fasting and purging, the powdered seeds (10 to 30 grains) or the oil (10 drops) may be mixed with syrup or emulsion of acacia and syrup, administered on an empty stomach, and followed by a saline purge or castor oil one or two hours afterward. The oil may be given in capsule to older children and adults. It is not contraindicated by irritation of the bowels. Oil of chenopodium has recently been found to be completely effective in the removal of the hook-worm (Ankylostoma Uncinaria, or Uncinaria Americana).

CHIONANTHUS.

The bark of the root of *Chionanthus virginicus*, Linné. (Nat. Ord. Oleaceæ.) United States from Pennsylvania southward. *Dose*, 5 to 30 grains.

Common Names: Fringe Tree, Old Man's Beard, Snowdrop Tree.

Principal Constituents.—Chionanthin and saponin.

Preparation.—*Specific Medicine Chionanthus. Dose*, 5 to 30 drops.

Specific Indications.—Icteric hue of skin and conjunctiva; dull hepatic pains and tenderness or soreness upon deep-pressure; light clay-colored, or frothy yeast-like stools; sallow, dirty-looking skin with hepatic tenderness and expressionless eyes; intense cutting pain from liver to navel, attended by nausea, vomiting, and great prostration; icteric coloration without pain; the urine stains the clothing yellow; colic, with green stools; jaundice, with pale watery alvine discharges and intense itching of the skin; pain simulating colic, extending from liver region over the whole abdomen; tympanites; and presence of sugar in the urine.

Action and Therapy.—Medicines that actually and positively influence the liver and its secretions are not numerous, notwithstanding that for many years much misdirected attention was bestowed upon that greatly

abused and usually very innocent organ. "Liver-tapping" virtues, now quite forgotten, were ascribed to mercurials and many other powerful drugs. Those that have weathered the campaign and been found to have a lasting reputation have been vegetable drugs chiefly and of either domestic origin or of Eclectic development. None more deserves a place among these than chionanthus.

There are two prime indications for chionanthus—jaundice as shown by the icteric hue of the skin and conjunctiva, and hepatic colic with soreness in the region of the liver. The pain is dull, heavy, and in the right hypochondrium, with a sense of weight and fullness, there is soreness even on light pressure and deep-seated tenderness on strong pressure, the feces are light in color and float upon water, the urine scanty and orange-tinted, there are occasional hectic flushes, and sometimes diarrhœa, with frothy, yeast-like stools.

Chionanthus is the most positive remedy for simple jaundice not dependent upon malignant or other organic changes in the liver and its appendages. It relieves portal congestion promptly, and is therefore a logical remedy for hepatic engorgement. Whether it is a remedy for jaundice associated with gall-stones, or dependent thereon, has been a question of dispute. Practically it seems to act in any instance where the imprisoned bile can be liberated by reducing the attendant swelling and congestion. In complete obstruction it fails, as do other remedies. One effect of chionanthus is to attenuate the bile, and there can be little doubt that it prevents the formation of biliary calculi. When the concretions are small and pass with a fair degree of ease, we believe it beneficial; but when they are strongly impacted it is doubtful whether chionanthus has any influence upon them or power to dislodge them. But in jaundice depending upon functional inactivity and other forms of mechanical obstruction, it is the first remedy to be considered. In a single case of Weil's disease that came under our care, it was a most efficient remedy, echinacea being alternated with it to control septic manifestations. For the acute catarrhal jaundice of children and the jaundice of the new born, it acts more favorably than any remedy known to us.

When gastric and duodenal troubles depend upon deficient action of the liver, chionanthus is most frequently indicated. It is useful then in chronic intestinal inflammation, in chronic duodenitis, chronic gastritis, the irritation of stomach and bowels due to high living, and is a remedy of considerable value in the gastro-intestinal and hepatic disorders of dipsomania. It has been asserted by many whose large experience entitles them to credence that chionanthus is a potent and satisfactory medicinal aid in glycosuria, when the glycogenic function of the liver is at fault. While it is believed to have some effect upon the functions of the pancreas, it is probably of little value in that worst form of diabetes mellitus in which the cells of Langerhans are destroyed. It should be given renewed study in the glycosuria of obesity and when sugar intolerance alone, and not starch disturbances, create what so often passes for diabetes. These are rather prediabetic conditions, if tending in that direction at all, but even if untreated might never reach the true diabetic state. There is good reason to believe that the prolonged use of chionanthus will be of much benefit in such cases.

CHIMAPHILA.

The leaves or whole plant of *Chimaphila umbellata* (Linné), Nuttall. (Nat. Ord. Ericaceæ.) North temperate region of the Northern Hemispheres, and in the United States, in dry shady woods.

Common Names: Pipsissewa, Prince's Pine, Ground Holly.

Principal Constituents.—*Chimaphilin* ($C_{24}H_{21}O_4$), and *arbutin* ($C_{24}H_{32}O_{14}$. H_2O).

Preparations.—1. *Infusum Chimaphilæ*, Infusion of Chimaphila (℥ss to Water, Oj). *Dose*, 1 to 4 fluidounces

2. *Specific Medicine Chimaphila*. *Dose*, 5 to 60 drops.

Specific Indications.—Scanty urine, but excessive voiding of mucus, muco-pus, or bloody muco-pus; smarting or burning pain upon urination; chronic vesical catarrh, with marked debility.

Action and Therapy.—Chimaphila is both an antiseptic diuretic and a positive alterative. It does not derange but seems to favor digestion, and has a good influence upon the processes of nutrition. In chronic affections of the renal tract with large mucous, muco-purulent or purulent discharges it is of the utmost value. Thick and ropy urine, such as is voided by old people and in cases of chronic cystitis, with a pinkish or reddish sediment of mucus, pus, blood and "brick dust" is an especial indication for it. Sometimes it is of value for the urinary disorders following gonorrhœa. Purulent discharges from a pyelitis, or due to calculous irritation, also guide to the selection of this simple but effective urinary antiseptic, sedative, and diuretic. Albumin has disappeared under its use, though the cases were but incipient cases of albuminuria. Not much hope should be expected from it in confirmed nephritis. It is often useful in chronic prostatic irritation and in some cases of prostatitis, particularly those associated with chronic catarrh of the bladder. The agent should be used preferably in infusion and for a continued time. If desired, specific medicine chimaphila may be employed dispensed in water, with some glycerin. However, when used in this way it precipitates and is unsightly, and a better way is to dispense it in bulk with directions to dilute it freely when used. The dose of specific medicine chimaphila is from ten to twenty drops diluted every two, three or four hours, according to the urgency of symptoms. As a tonic and alterative we have used it for a long time with the greatest of satisfaction. A recent writer in the old world has credited chimaphila, in doses as given above, with causing the disappearance of sugar in glycosuria. Chimaphila is a neglected remedy that may well take the place of other agents of questionable safety.

CHLORALUM HYDRATUM.

Hydrated Chloral, Chloral Hydrate; Chloral (improperly) nearly pure, $C_2HClO_3.H_2O$.

Description.—Transparent colorless crystals having a strongly caustic and bitter taste and a penetrating and unpleasant aromatic odor. Easily soluble in water, alcohol, ether, chloroform, olive oil, and oil of turpentine. *Dose*, 1 to 30 grains, the usual doses being 5 to 15 grains.

Specific Indications.—Insomnia from cerebral hyperæmia; pulse soft and temperature normal or somewhat increased; headache, with cerebral hyperæmia; spasms, when not associated with debility or depression; delirium tremens, in the absence of fatty heart, and with great cerebral excitation; hot, dry skin, elevated temperature, and flushed face; nausea

and vomiting from cerebral hyperæmia; surgical fever, with excitement and delirium; poisoning by strychnine; tetanus.

Action and Toxicology.—Chloral hydrate is a topical irritant. If kept in contact with the skin it causes redness and inflammation; if applied to the mucosa rubefaction, burning pain and acute inflammation may result. Upon denuded surfaces or wounds it is powerfully irritant, and under some conditions it may vesicate. Injected into the rectum it causes heat, irritation and sometimes ulceration; subcutaneously it produces pain and sloughing. Liebreich and others once taught that chloral was broken up in the blood into chloroform and salts of formic acid. That view is no longer held, as it is known to circulate in the blood as chloral and is eliminated by the kidneys as urochloralic acid, unless given in excessive quantities; in which instance some unchanged chloral is voided. The view also now prevails that probably chloral has but little influence upon the blood, in any-sized doses.

As a rule, small medicinal doses do not appreciably affect the circulation or respiration, but profoundly affect the cerebrum, producing quiet and refreshing slumber very similar to that of normal sleep. It is, however, most uncertain in its effects upon the heart and breathing, and even small doses have been attended with very alarming prostration and sometimes death. If more than 20 grains are given, depression becomes evident—the vaso-motor centers and the heart-muscle being directly affected, so that the pulse becomes slow and weak, or races and becomes thready. Chloral is never absolutely safe, and even when it is least expected it may cause respiratory paralysis and death.

The dominant action of chloral is upon the higher cerebral cells, producing sleep; upon the motor neurons of the cord, abolishing muscular movement and reflex action; and upon the medullary centers of breathing and circulatory control. These are affected in the order named, so that each can be impressed, by selected dosage, in downward progression. It appears to have but little effect upon the sensory ganglia, but if given in excessive quantities it may cause general anæsthesia. Chloral probably produces sleep by inducing cerebral anemia. It not unfrequently causes an erythematous rash followed by desquamation, and more frequently a purpuric eruption.

Subjectively chloral produces the following general effects: Hot pungent taste, increased salivary flow, gastric warmth, and increased appetite. If the dose be large, vomiting may result. The patient falls into a quiet sleep from which he can be aroused to take nourishment or to respond to calls of Nature, when he again sinks into slumber, usually without dreams, and upon awakening no unpleasant after-effects are experienced. In this respect chloral has the advantage over opium and many other hypnotics. Large doses of chloral induce profound narcotism, with abolishment of muscular power, reduced temperature, and loss of sensation and the reflexes. Lethal doses cause slow breathing, weak, thready, fluttering pulse, soon lost to the touch, a sinking sensation, complete muscular relaxation, pallid and livid countenance, cold sweat, and deep coma from which there is no awakening. Then follows centric paralysis of breathing and the circulation, and the victim dies anæsthetized and paralytic.

Death from chloral reveals, upon post-mortem examination, meningeal, cerebral, spinal, and pulmonary congestion, with a distended right heart.

The treatment of acute chloral poisoning is similar to that for narcotics. As a peculiar coldness pervades the victim, artificial heat should be applied to the extremities, and to the præcordium. Alcohol, ether, or ammonia in repeated small doses may be given by the mouth, rectum, or subcutaneously. Friction, flagellation with wet towels, faradization, or galvanism to the region of the diaphragm, cold applications to the head and neck, artificial respiration, and hot coffee, or caffeine to sustain the heart, should be administered. Atropine, digitalis (by mouth or by rectum), and strychnine should be given hypodermatically to sustain the breathing and circulation. Amyl nitrite may be cautiously applied to the nostrils, but its effects must be closely watched.

Chloralism. Chloral hydrate is taken by some individuals until the chloral habit is formed. Chronic chloralism presents serious disturbances, the chief among which are the following: The chloral habitué is a voluble talker, speaking in a quick and excitable manner; the eyes are irritable and hyperæmic, though brilliant. Tinnitus, sudden dizziness, wakefulness with irritability and great nervous unrest, are experienced, and the victim can not sleep without the hypnotic effects of the drug. Mental hebetude, melancholia, loss of memory, hallucinations, and maniacal excitement, are among the nervous symptoms. The person is easily tired and has no capacity for exertion; efforts at work are prostrating, and all the voluntary movements are irregular and uncertain. There may be no appetite, or if present it is always capricious, digestion is very feeble and attended with dyspnœa when the stomach is full, and the stools light and pasty, showing a lack of bile, though the latter stains the urine, which may also contain albumen. The heart-action becomes progressively feeble and irregular, and rashes and purpuric spots may appear on the skin.

Chronic chloralism is best treated by gradually lessening the quantity of the drug consumed; nourishing and easily digested food, and tonics, particularly iron salts, should be exhibited. Cathartics should be occasionally resorted to. Cannabis indica is said to aid the stomach, and lessen the appetite for chloral. As calmatives to the nervous system, lupulin and hyoscyamus may be used, while strychnine is indicated as a nerve stimulant.

Therapy.—*External.* A glycerin solution of chloral (20 grains to the ounce) was valued by Locke to dissolve diphtheritic deposits. Solutions (1 to 100) have been applied to ulcerated cancers of the breast and uterus, and to gangrenous ulcers to control fetor, as well as in diphtheria (1 in 300), and bromidrosis of the hands and feet (1 to 150). Solutions (1 in 20) allay itching in prurigo, eczema, and other pruritic skin disorders and may be applied to tinea, scald-head, pityriasis (scalp), and other parasitic cutaneous affections. Chilblains and bunions are relieved by a 5 per cent solution, and small burns and scalds may be treated with chloral and Carron oil (1 in 16). A 5 per cent solution destroys excessively purulent granulations of the tympanum and the bases of aural polypi. Chloral should be used with great caution, however, in diphtheria, in which the heart is necessarily in danger

at all times, and upon denuded surfaces, lest absorption result in acute chloral depression.

Camphor-Chloral is useful to mitigate pain when applied behind the ear in mastoiditis; and it and the following preparation may be used as a local anæsthetic for neuralgic pains: ℞ Camphor, ℥iv; Menthol, ʒj; Chloral Hydrate, ℥j; Oil of Gaultheria, fl ʒj; Alcohol, q. s. fl ℥ij. Mix. Apply topically but do not cover. A liquid anodyne and counter-irritant, prepared by rubbing up equal parts of chloral, menthol and camphor, gives relief in myalgia, lumbago, intercostal neuralgia, pleurodynia, and sometimes in sciatica. Some prefer a plaster containing powdered chloral as more effective in the latter disorder, though care must be taken not to destroy the skin.

Internal. Chloral is one of the purest of hypnotics. Its chief uses should be to induce sleep and allay spasms. With but few remedies is it so absolutely essential to know the proper indications, for if used when contraindicated it takes but very little of chloral to kill. It is contraindicated always when there is an anemic condition of the brain. It can not safely be given to old topers, nor should it be used where the heart-walls are thin or where fatty degeneration of the organ is established. All cases of marked depression are warnings not to give chloral. On the other hand, when indicated, no remedy is more useful nor more satisfactory in its results.

An *active hyperæmic state of the brain* is an indication for chloral, and particularly if there be *sleeplessness* from nervous excitement but not from pain. Its use here is the same as that of potassium bromide, which it exceeds in efficiency. If sleeplessness be due to pain, it is less efficient than opium.

Three important indications are fulfilled by chloral: It produces sleep, relaxes spasm, and to a limited extent relieves pain. In sleeplessness, and more especially when the insomnia is the result of brain exhaustion, from previous mental or moral excitement, or in sleeplessness and excitement where opium or other narcotics are objectionable, as in acute mania, delirium tremens, hysteria of plethoric women, etc., chloral is indicated, but it should be remembered that it is not to be administered to persons greatly enfeebled, nor to those who are subjects of any dyspnœic or cardiac affections.

While chloral is a dangerous remedy in the depression of confirmed inebriates, it is of value in delirium tremens, where opium would be inadmissible. The condition admitting it is one of over-stimulation of the brain and nerve centers, while in the opposite condition, where the brain suffers from a want of stimulation, it is inadmissible, while opium and alcohol act beneficially. Chloral is to be used where there is great excitement, dry skin and tongue, increased temperature, and flushed face. The pale face, feeble circulation, muscular relaxation, and surface bathed in perspiration are contraindications to its employment.

Chloral is one of the most certain anticonvulsive remedies in tetanus and in poisoning by strychnine or nux vomica. About 20 grains of chloral should be given with 40 to 60 grains of potassium bromide, by mouth, if possible; if not, by rectum, preferably dissolved in starch water. If spasm prevents such administration the patient should be anæsthetized by

choloroform to allow their administration and retention. This does not always lessen the severity of the spasms, but renders them less frequent. Unfortunately, like every other remedy in these fearful conditions, it frequently fails. Care should be had that lethal effects are not produced by the antidote. It is a prompt remedy for obstinate hiccough.

Chloral, although not effecting recovery, sometimes restrains the violence of the convulsions in epilepsy and chorea and the muscular movements in paralysis agitans. As the latter usually occurs in enfeebled individuals, we should regard the advisability of its use with suspicion.

It should be cautiously used if at all in infantile convulsions, though frequently effective and better borne by children than by adults. The dose should not exceed one grain with double the quantity of sodium or potassium bromide. For these convulsions and for whooping cough there are many safer drugs than chloral. Chloral will quiet nervousness and produce sleep in fevers. Surgical fever is the best type in which to employ it. It should have no place in the adynamic fevers, such as typhoid and typhus fevers.

While chloral relieves pain to some extent, it takes large and comparatively unsafe doses, hence in the many painful states in which it has been previously used it may well be replaced by more direct anodynes. The same is true of its use in spasms, with pain, as in the passage of renal and hepatic calculi, strangulated hernia, and to relax muscular rigidity in order to facilitate the setting of fractures; other antispasmodics are safer and to be preferred.

Small doses of chloral relieve vomiting. Used either by mouth or by rectum the vomiting of pregnancy has yielded to it. Thomas advised it in the gastro-intestinal disorders of children, with nausea and uncontrollable vomiting due to cerebral hyperæmia. Very small doses are to be used—1 to 4 grains added to 2 ounces of water or syrup, and a teaspoonful of the mixture given every half hour, as indicated. Scudder recommended chloral in 1 grain doses, with hydrastin (berberin) in irritable dyspepsia. It sometimes relieves the vomiting of seasickness. Chloral (10 grains), with specific medicine hyoscyamus (10 drops), sometimes relieves the wretched headache of the menopause, with insomnia, in robust women.

Chloral hydrate in doses of from 15 to 20 grains, repeated as needed, and continued no longer than necessary to produce results, is favored by some to facilitate parturition. It is said to regulate contractions, lessen their severity, favor dilation of the os, and control the mental apprehension and nervous excitement. It is less valuable in after-pains. Some have also advised it in puerperal eclampsia, in which it often succeeds, but its effects must be closely guarded.

Chloral hydrate is not used in subcutaneous injection (except in strychnine poisoning), as its action is too irritating and apt to be followed by troublesome abscesses, and should it be injected into the veins its influence upon the heart and lungs is of a dangerous nature. Internally, for an adult, its ordinary dose varies from 10 to 30 grains, to be repeated every 1, 2, or 3 hours, as indicated; children, who stand chloral better than adults, also require much less, say, as many grains for a dose as there are years of the child's age. The dose, however, may vary from 5 to 10 grains

as a hypnotic, which, in severe cases, may be increased to 20 or 30 grains. Liebreich recommends 7 grains as the dose for children; for adults from 25 to 30 grains, where short intervals of sleep are required, and repeated every 2 or 3 hours, and in cases where more determinative effects are demanded at once (as in strychnine poisoning and tetanus only), from 60 to 120 grains at once. As a rule it is better to prescribe moderate and frequently-repeated doses rather than one large dose. The best form of its administration is in distilled water, being well diluted, 1 part of the hydrate to 50 of water. When the dose is large, its bitter, pungent taste may be corrected by the addition of some syrup, tincture of orange, or by giving it in mucilage. There is some evidence of cumulative effects having been produced by chloral. In painful states, morphine, when not otherwise contraindicated, is often administered in conjunction with chloral hydrate. Alkaline additions to it must be avoided, and the chemical constituents of the food taken before or after its administration should be taken into consideration. It may be given in some aromatized syrup, to conceal its taste. When used in enema, the saturated solution should be mixed with some mucilaginous, albuminous, or oleaginous fluid. Chloral hydrate has been incorporated in suppositories.

RELATED PREPARATIONS.

Chloralose.—This is an acrid, nauseous, habit-forming compound of anhydrous chloral and glucose. Though milder its action is said to be like that of chloral. As it sometimes produces unpleasant symptoms—nervousness, diplopia, tremors, and even catalepsy and tetanic movements—it is not a desirable medicine. When used at all, it is for functional insomnia, sleep obtaining in about one-half hour. The dose is from 2 to 7 grains, the smallest dose being recommended first, particularly for women (Hare). It should be administered in capsules, followed by milk or water.

Chloralamine (Chloral formamide) is an odorless crystalline substance, of a bitter taste, and soluble in water (20), and more readily in alcohol (1.5). A substitute for chloral, but less depressing to the circulation and less irritant to the stomach and kidneys. It has the advantage over chloral in that it also controls pain. Chloralamine has been recommended where chloral is useful, but especially in nervous wakefulness, neuralgia, and the pain of tabes dorsalis; and as "chlorobrom" (combination of equal parts of chloralamine and potassium bromide) to relieve insomnia in the melancholic and acute maniacal forms of insanity.

Charteris advised this combination in seasickness, the patient first inducing the bowels to move by means of a cholagogue, then boarding the ship, taking the dose and going to bed at once and obtaining sleep. Upon awakening the likelihood of nausea is said to have been averted.

Chloretone (Acetone-chloroform). Colorless crystals of a camphoraceous odor, slightly dissolved by water, and very readily by alcohol. Antiseptic and anæsthetic. Used like chloral, but said to be unlike it in that it does not depress the breathing or circulation, nor irritate the stomach, being rather a sedative to the latter. It has been used with good effect in vomiting, to prevent post-ether vomiting (5 to 10 grains before anæsthetization), and seasickness (3 to 5 grains 3 times a day); also to relieve pain in gastralgia and gastric ulcer; and locally, alone or with boric acid in 10 per cent ointment, for the relief of pain in burns, scalds, excoriations, ulcers, and lacerations, etc. With oil of cloves or ether it obtunds pain in toothache when applied to the cavity of the tooth. It is not incompatible with antipyrine, and both together have been given for neuralgia and nervous unrest. A 1 per cent solution (in alcohol, 15; water, 85) has been used to induce local anæsthesia; by rectum (℥j in oil) it is of asserted value as a palliative in tetanus. Headache sometimes follows large doses of chloretone. *Dose*, 5 to 20 grains in capsules.

CHLORAL BUTYLICUM.

Obtained by the interaction of chlorine and acetic aldehyde. (Formula: $C_4H_6ClO_2 + H_2O$).

Common Name: Butyl-Chloral Hydrate.

Description.—Scaly crystals of a warm and bitterish taste, soluble in hot water, alcohol, ether, and glycerin; less soluble in cold water (1 in 50). *Dose*, 3 to 20 grains.

Action and Therapy.—A powerful drug producing an anæsthetic and soporific state without impairment of the circulation, breathing, or temperature, and while motion is more or less impeded by it, it conserves muscular tone so that a person under its influence may sleep deeply while sitting upright. It is used as a palliative in trigeminal neuralgia, and tic-douloureux, and in insomnia when chloral is inadmissible. It is contraindicated by weak heart, cerebral hyperæmia, or gastro-intestinal irritation. Small doses, 3 to 5 grains, should be given until pain is relieved, and the larger doses for sleeplessness. They may be administered in glycerin, or syrup of licorice, or peppermint. Great care should be had in its use. It is scarcely employed in Eclectic practice.

CHLOROFORMUM.

Chloroform.

Nearly pure $CH Cl_3$ with a small per cent of alcohol.

Description.—A mobile and inflammable colorless and clear liquid of a sharp, hot, and sweet taste, and a peculiar but pleasant ethereal odor. It mixes with alcohol or ether, and is sparingly soluble in water. *Dose*, 1 to 10 minims.

Preparations.—1. *Aqua Chloroformi*, Chloroform Water. *Dose*, ʒj to ʒj.
2. *Spiritus Chloroformi*, Spirit of Chloroform. *Dose*, 5 to 60 minims.
3. *Linimentum Chloroformi*, Chloroform Liniment.

Specific Indications.—To produce anæsthesia for surgical purposes; to alleviate pain; to relax spasm and control convulsions; to dissolve biliary calculi (?); to check severe and protracted chills (gtt. x to xx.).

Action and Toxicology.—The chief action of chloroform is upon the nervous system, producing after the manner of alcohol and ether, but with some variation, a progressive intoxication comprising a stage of diminished consciousness, one of excitement, and a third of complete unconsciousness. There takes place a progressive depression and paralysis of the "highest cerebral functions, those of self-control, and passing downward through the lower intracranial divisions. The spinal cord is affected before the medullary centers, which are the last part of the nervous system to become paralyzed" (Cushny). Hare gives the order of progression as first "the sensory part of the brain, then the sensory part of the spinal cord, then the motor tract of the cord, then the sensory paths of the medulla oblongata, thereby producing death from failure of the vaso-motor center, and of the respiratory center unless, as rarely occurs, the heart has already succumbed to the drug."

Much discussion has been had as to the method in which chloroform produces death, the belief formerly prevailing that it was nearly always due to cardiac paralysis. The first (1889) and second (1890) Hyderabad Commissions combated this view of its action upon the heart, and claimed that the lungs were the organs mainly and primarily involved. The experiments of this body were performed in India and upon dogs. European and American observers have vigorously combated this theory of primary respiratory paralysis, the majority of deaths in Europe and America resulting apparently from cardiac paralysis. J. A. MacWilliam (*British Medical Journal*, 1890) claimed that chloroform directly affects the heart substance, and that death from cardiac failure is the rule, the manner of failure being due to a more or less sudden dilatation of both sides of the

heart, with marked enfeeblement of that organ, the feeble state and distention of the heart, which is unable to propel the blood, explaining the failure of artificial respiration to revive the patient. He showed that respiration may continue for several minutes after the heart has ceased to beat. The ground occupied by Wood (1890), Laborde (1890), Reeve, Dunlop, and others, is probably nearest to a correct solution of the lethal action of the drug. According to these observers, death may take place either from primary cardiac or from primary pulmonary paralysis, either taking place independently of the other. Hare, however, has conclusively shown that the usual cause of death from chloroform is vaso-motor depression, allowing "the blood to pass too freely from the arterioles into the great bloodvessel areas which exist in the capillaries and veins, and as a result the man is suddenly bled into his own vessels as effectually as if into a bowl." He concludes, therefore, that while "chloroform without doubt acts as a powerful depressant poison to the respiratory center and the heart in the same manner as it paralyzes all living protoplasm when applied in excess, that when properly given by inhalation it produces a death equivalent to that resulting from hemorrhage, which is a failure of the respiration not so much from direct depression of the respiratory center as from its deprivation of blood; and while the tendency of the drug is to depress and dilate the heart, just as it dilates the vessels of which the heart is merely a highly specialized part, the failure in the pulse is due to vaso-motor palsy, the patient becoming pulseless because the heart has no blood to pump."

Locally applied chloroform acts as an irritant and anæsthetic to the sensory nerve trunks, but no such effects, or at least but little, are produced by its inhalation. Scarcely any impression upon the blood is produced by inhalation of the vapor. Temperature, however, is lowered, but to a less degree than under ether. Elimination of the drug takes place rapidly by way of the lungs chiefly, which are likely to be irritated and inflamed if the quantity be large. Prolonged chloroformization is said to produce degenerative changes of a fatty character, and sometimes with necrosis, in the tissues of the vital organs, not greatly unlike that resulting in phosphorus poisoning. Some believe with Meyer and Overton, that chloroform induces anæsthesia through its property of causing solution of the lipoid or fatty matter within the brain cells. The symptoms produced by chloroform under its various applications are as follows:

I. Externally, Internally, and Subcutaneously. Chloroform applied to the skin reddens it, and if evaporation be prevented, tingling, burning, and vesication are apt to result. Injected subcutaneously in small amounts (10 to 20 minims) it causes some pain at first, followed by numbness, which is succeeded by complete anæsthesia of the part, the tissue around the puncture becoming first puffy and then indurated, the induration persisting for many days. Taken internally, it has a sweetish, hot, and pungent taste, and if undiluted, may cause severe irritation or inflammation of the mucous tissues. Hence it is customary to administer it in emulsion or as chloroform water. Heat and inflammation, followed by œdema of the larynx, may occur if the concentrated vapor be inhaled during the act of swallowing the drug. In the stomach warmth is first experienced, followed by a cold

sensation, and if the drug is not well diluted, a severe gastritis may ensue. Effects not unlike those after the ingestion of alcohol or ether follow when chloroform is taken in moderate amounts into the stomach—an increased circulation, fullness of the head, giddiness, mental confusion, and brief cerebral excitement or inebriation, succeeded by sleep. About 1 drachm subcutaneously, or 1 or 2-drachm doses by mouth, induce a soporific state, which obtains very slowly, but is singularly prolonged, the drug presumably being very gradually absorbed into the blood. Such a sleep is not accompanied by anæsthesia, for the patient may be very easily aroused, and will again lapse off into sleep. The pulse is slightly slowed, while a reduction in temperature to the extent of 1° or 2° F. is generally effected. A dose of 1/2 fluidounce has occasioned alarming symptoms, among which are convulsions, trismus, partial pupillary dilatation, insensibility, retarded and stertorous breathing, frothing at the mouth, livid countenance, bloody stools, and feeble or irregular pulse. Blood may be ejected from the stomach also. Taken in lethal doses, profound stupor, insensibility, and death result. Death results from vaso-motor paralysis, asphyxia, or from cardiac paralysis, or from these and inflammation of the stomach combined. Under chloroform poisoning the pupils may either be contracted or dilated. Usually vomiting occurs, though after large doses no vomiting has taken place. The smallest fatal dose recorded is "a drachm or two," which killed a boy of 4 years in 3 hours; 6 to 7 drachms is the smallest fatal dose in an adult. A fluidounce has frequently killed, and the time required to produce death generally ranges from 1 hour to 8 days (Taylor, *Medical Jurisprudence*).

The post-mortem appearances are congestion and inflammation—congestion of the brain and pulmonic structures, and congestion, inflammation, and ulceration of the gastric portion of the gastro-intestinal tract—the intestinal portion usually presenting nothing marked except some congestion and the odor of the drug. The bronchi are bathed with sanguineous mucus or muco-pus. Coagulation of the blood is prevented, that liquid being found unusually fluid in the vessels. The post-mortem appearances are not, as a rule, constant. Poisoning by swallowing chloroform must be met by emetics, the stomach-pump, or lavage tube; the further treatment is that of narcosis by inhalation (which see under Æther). On account of its burning taste and pungency, chloroform is rarely selected for suicidal purposes.

II Inhalation and Anæsthesia. The effects usually occasioned by anæsthetic doses of chloroform are, whizzing and pulsation in the head, a change in the apparent color of objects, pleasurable ideas and visions, loss of consciousness, incoherent talking or muttering, and sometimes loud or noisy respiration, muscular relaxation, and complete insensibility to pain, from whatever cause. A minute or two generally suffices to occasion anæsthesia, which will last for several minutes, but may be continued for an indefinite period by carefully repeating the inhalation at certain intervals of time, as its influence is observed to be decreasing. Sometimes, from the coughing produced, or other circumstances, it may require a long time before its anæsthetic effect is induced. This may be obviated by holding it, at first, a little farther distant from the nostrils, that it may be better

mixed with atmospheric air, and then gradually approaching it to them. Its anæsthetic influence is succeeded by somnolence, or a calm slumber, and usually there is no remembrance of incidents which happen during the anæsthesia.

The full anæsthetic effects of chloroform are always attended with great hazard. It has been administered to an extent sufficient to produce torpor of the nerves of sensation without completely destroying consciousness, so that, in some cases of childbirth, it may be unnecessary to risk the production of an entire suspension of the mental powers. Always, however, it is unsafe to perform even the most trivial operation until complete unconsciousness has been effected, a majority of the fatal accidents from chloroform inhalation having been observed in minor operations where incomplete anæsthetization had been practiced. It is probable that the fatalities attending the extraction of teeth, etc., are in part due to the fact that the drug was inhaled in the sitting posture; and that many deaths from chloroform have been hastened by fear. For inhalation only the purest chloroform should be used. About a fluid drachm is the quantity generally used at a time for inhalation, and this should be renewed every 3 or 4 minutes until the required effect takes place. The only apparatus needed to inhale chloroform is a handkerchief, closely, but not too tightly, rolled up, and held in the hand, having a concavity into which the choloroform is poured, and then placed several inches from and not immediately in contact with the mouth and nose. A better method is to use the Esmarch inhaler. A quantity of common air should always be allowed to enter the lungs with the chloroform vapor. It is never safe to administer chloroform vapor in greater proportion than 2 per cent, the rest being atmospheric air. It should be remembered that the vapor of chloroform is heavier than air, so that it should not be held too close to the nostrils, lest the air should be wholly replaced by it. As soon as the requisite amount of insensibility occurs, its inspiration should be discontinued, and only carefully repeated when there is too early a restoration to consciousness. Epileptics, those laboring under fatty or degenerative disease of the heart, those predisposed to apoplexy, or cerebral determinations, and persons who have recently lost much blood, or the very anemic, or diabetics, should not be placed under the anæsthetic influence of chloroform. It should never be administered immediately after a hearty meal, as it may cause vomiting; and when the pulsations fall below 60, the inhalation should be stopped. Operation should not be attempted until the cornea is insensitive and muscular relaxation has set in. Some, however, prefer to wait for muscular relaxation, stopping short of stertorous breathing. (For details of administration, comparison with other anæsthetics, and other directions, see Æther.)

Chloroform Habit. Chloroform continuously consumed for the purpose of producing inebriation, as it often is, is more pernicious in its effects and more intractable to treat than the opium habit. Enormous quantities, as much as a pound, have been consumed in a day, but life can not long resist such amounts. Occasionally only acute symptoms lasting a week or so, and characterized by hallucinations of sight and sound, noisy delirium and furious maniacal raving may be the effects. More often, however, a chronic form ensues, with mental irritability, melancholia, or hypochondriasis,

delirium, and early decay of the intellectual powers. The worst phases of moral depravity may also be exhibited. Fortunately, this use of the drug soon destroys its victims.

Therapy.—*External.* Chloroform is antiseptic and anæsthetic. A few drops added to urine or to other organic fluids prevent fermentative and putrefactive changes due to micro-organisms. Being hemostatic it may be applied upon cotton to arrest small superficial hemorrhages. As a rubefacient and anodyne, liniment of chloroform is effective for the relief of myalgic, neuralgic, and rheumatic pain. The vapor of chloroform applied directly to the part will sometimes relieve the pangs of sciatica and the suffering from myalgia, lumbago, and nervous headache. Where the area is small, as in the latter, a little chloroform may be poured into a watch-glass and the latter inverted upon the part, as the temple. Applied in this way, or upon a folded handkerchief, it is effectual in localized neuralgias, as of the face. The vapor should be kept in contact until the pain is relieved. Locke recommends as an efficient liniment for the relief of pain: ℞ Chloroform, fl ℥ vj; Tincture of Aconite, fl ℥ ii; Spirit of Camphor, fl ℥ ijss; Glycerin, fl ℥ ss. Mix. Sig.: Apply with friction. Another excellent liniment is the following: ℞ Chloroform, Tincture of Aconite, aa fl ℥ j; Soap Liniment, fl ℥ ii. Mix. Sig.: Apply on flannel. Thirty minims of chloroform, mixed with 5 drachms of lard, have been employed as an ointment in cutaneous eruptions of a papular character, and lotions containing chloroform give relief in urticaria. When applied to the uninjured skin there is no necessity for diminishing the strength of chloroform; a pledget of cotton moistened with it may be applied to the part, and its volatilization may be retarded by covering this with several thicknesses of gauze. In earache, from acute catarrh of the middle ear, the vapor may be cautiously passed into the external meatus by means of an insufflator or a common clay pipe; the escape should not be prevented, however, lest the part be blistered. Therefore it should not be introduced on cotton. In both mastodynia and mammitis its local action has given relief. Applied to the epigastrium it has relieved cholera morbus, and over the abdomen has allayed painful affections and spasms of the viscera. Rheumatic toothache may be palliated at least by rubbing the gum with chloroform, while camphorated chloroform will often alleviate pain from dental caries, if applied to the cavity on cotton. Deep subcutaneous injections, first employed by Bartholow, have been used to give relief in neuralgias, particularly of the trifacial and sciatic nerves. The injection should be deep, and near the sheath of the nerve trunks. Induration follows where the needle is introduced, and occasionally abscess. Injection into the gums is asserted to frequently cause gangrene. Deep injections are by no means safe or popular practices. Ointment of zinc oxide to which is added one-eighth part of chloroform is said to give relief in rectal ulcer and pruritus ani.

Internal. Internally, chloroform is a stimulant, sedative, antispasmodic, and anæsthetic. It has been used successfully as a relaxant in asthma, spasmodic cough, hysteria, and to allay the pain in atonic quinsy, lead colic, biliary or renal colic, passage of renal calculi, gastralgia, gastric ulcer, atonic dyspepsia, cancer, neuralgic affections, and to avert chills in intermittents. It may be administered in doses of from 30 to 80 drops in

solution of gum Arabic, or in a mixture of water and yolk of egg, repeating the dose if required every 1/2 hour, hour, or 2 hours, until it has given relief. Spirit of chloroform is a good and pleasant preparation. The solution of camphor in chloroform is a pleasant form of administering that medicine.

Nausea and vomiting where no inflammation is present, as of sick headache, seasickness, pregnancy, etc., may often be relieved by giving from 2 to 5 drops of chloroform on sugar. Added to cough mixtures it aids in controlling nervous cough. Internally, a full dose administered just before the chill may cut short a paroxysm of intermittent fever, and a few drops of chloroform, or better of chlorodyne, sometimes arrests the symptoms of Asiatic cholera. While inhalations of chloroform are inadmissible in old topers and in delirium tremens, its internal use is valuable where marked depression is present. ℞ Chloroform, fl℥j; Diluted Alcohol, fl℥jss; Tincture of Capsicum, fl℥jss. Mix. Sig.: Teaspoonful doses in water. From 10 to 15-drop doses of the same are useful in flatulent colic and hiccough. Some have recommended chloroform in teaspoonful doses every hour during the pain, and 3 times a day subsequently, as a solvent of cholesterin in biliary calculi. Though it undoubtedly does not reach nor dissolve the calculus, it certainly relaxes the spasm of the tube through which it passes, thus effectually allaying the pain. Its local action, in such large doses, upon the gastro-intestinal canal is apt to be too irritant for this purpose, however, and there are better ways to treat hepatic colic. The same may be said of its similar use to remove tapeworm.

Chloroform water, or a few drops of chloroform added to mixtures of water-dispensed medicines, will preserve them for several days. Chloroform water is especially useful as a vehicle for cough mixtures and carminatives.

Inhalation. Chloroform was in use as an internal remedy for years before it became known as an anæsthetic. It was, however, used by inhalation in a case of pulmonic embarrassment as early as 1832. At the instigation of Mr. Waldie, of Liverpool, who had experimented with it in 1838-9, it was adopted and used first as an anæsthetic in November, 1847, by Sir James Young Simpson, M.D., of Edinburgh, who had been looking for a substitute for ether.

Chloroform is used by inhalation to produce (1) general anæsthesia, (2) to relax spasm, (3) to alleviate pain. Its largest use is to cause surgical anæsthesia, so that every form of operation may be painlessly performed. Either chloroform or ether are usually used in all major operations. The selection is largely a matter of preference with the surgeon. Wilcox has well stated that "the experience of the anæsthetist is more important than either anæsthetic or inhaler." All concede, however, that when neither is otherwise contraindicated (by conditions mentioned elsewhere) ether is by far safer than chloroform, and the former is rapidly displacing the latter as the anæsthetic of choice. Chloroform was once the most popular of the general anæsthetics. (For comparison of ether and chloroform, method of administration, indications, and contraindications, see these topics under Æther. Many forms of apparatus for the administration of anæsthetics, single or combined (chloroform; ether, oxygen, nitrous oxide, etc.) are on the market and in use, chiefly in hospitals. As these require special ma-

nipulation, and should be used only by those having special training in their use, consideration of them has been omitted in this work.)

Chloroform is usually preferred to ether in obstetrical manipulations, for several good reasons. Experience has shown it to be far safer in obstetric emergencies than when used in any other condition. Moreover, unlike ether it is not explosive should it come into contact with an open flame; it is pleasant to inhale; women do not dread but rather welcome it; less of it is required; the heart is not damaged because in pregnancy that organ is slightly overcompensated, and the frequently recurring contractions stimulate the vaso-motor control, thus antagonizing the great danger from the drug. When labor is normal, brief, and not very painful, its use should be avoided. If, however, the opposite be true, no drug is more beneficial and none will be more greatly appreciated by the woman In first labors it should be used with great care. It is seldom necessary to carry it to complete anæsthesia; in fact, it should seldom be carried beyond the stage of merely blunting sensibility. It mitigates the pains, though it does not interfere with the force and frequency of the contractions, when not pushed too far, while it promotes relaxation of rigid parts. Pushed too far it interferes with the contractions and favors hemorrhage. Its use aids the easy performance of the required obstetric operations, as turning, applying forceps, changing positions, extracting retained placentæ, or other manipulations, unless the patient be enfeebled by hemorrhage. If in the latter case it must be employed, it should not be used to complete unconsciousness. In turning, enough must be given to suspend uterine action, while in forceps delivery enough should be administered to quiet the patient, or if necessary, to accomplish relaxation of the muscles. In instrumental interference it tends to prevent shock. In craniotomy, symphyseotomy, or Cæserian section, the woman should be fully under the influence of the vapor. In most cases of labor a few whiffs of chloroform are allowed by many obstetricians just as the head is emerging from the vulva.

Chloroform is of great value in facilitating diagnosis, where a thorough examination is necessary. It prevents pain, thoroughly relaxes the parts, and does away with any objections that might otherwise be made by the patient. It is especially useful to aid in determining obscure abdominal, genito-urinary, pelvic, and rectal disorders, and in examining and reducing fractures and dislocations and replacing hernia by taxis.

Spasmodic respiratory neuroses are relieved by inhalation of chloroform. In the same manner it may be used in the various forms of colic—bilious, flatulent, renal, etc.: dysmenorrhœa, neuralgia, tic-douloureux, cancer, and other painful states. For these purposes full anæsthesia is never required. It may be employed in conditions of excitement, as in hysteria, puerperal mania (when not due to cerebral hemorrhage), chronic insanity, and maniacal excitement, and is extremely valuable in many spasmodic disorders of the muscular and nervous systems, many of which are also painful. Thus it is one of the best agents in hiccough, convulsive hysteria, chorea, tetanus, hydrophobia, and other convulsive disorders. In asthma, though it may not cure, it is unfailing as a palliative. It loses its power, however, after many repetitions of its use. It relieves severe whooping-cough and convulsions arising from cough. In laryngismus stridulus

its effects are prompt. In infantile convulsions it is certainly one of the best drugs to overcome the spasm, so that indicated drugs may be given to avert a return of the convulsive attacks. During the passage of gall stones and renal calculi, it not only relieves pain, but relaxes the spasmodically contracted tubes, thus facilitating the passage of the offending body. It is by far the best agent to control uremic spasms or convulsions from the same cause following scarlatina, while it stands at the head of all agents to check puerperal eclampsia. Veratrum should be given internally and morphine be hypodermatically injected. By the use of chloroform time is gained in which to administer other and appropriate remedies. It should not be forgotten as an aid to control the spasms in poisoning by strychnine. When no organic disease of the heart exists, the inhalation of chloroform will relieve angina pectoris, but the condition of the heart should be carefully ascertained before risking the agent. Amyl nitrite, followed by lobelia, is preferable. A few whiffs of chloroform will sometimes abort a malarial chill and thus time is gained for the action of antiperiodics.

The dose of chloroform is from 2 minims to 2 drachms; spirit of chloroform, from 10 to 60 minims, well diluted; chloroform water, 1/2 to 2 fluidounces; emulsion of chloroform, 1 to 5 drachms. For anæsthesia, by inhalation, the amount will be indicated by the effects produced.

CHROMII TRIOXIDUM.

Acidum Chromicum. Chromic trioxide, Chromic acid. (Formula: $Cr. O_3$.)
An anhydride prepared from acting upon potassium bichromate with sulphuric acid.

Description.—Beautiful deep purplish-red needle or prismatic crystals, odorless, very deliquescent and freely soluble. It forms brown-red to orange yellow solutions according to the degree of concentration. It must be kept in glass-stoppered bottles and never allowed to come into contact with organic matter (anything that will burn), such as cork, sugar, tannic acid, alcohol, or with glycerin, or with sweet spirit of niter, as dangerous explosions may occur. *Caution.—It should never be dissolved in any other fluid than water,* for physician's uses.

Action and Toxicology.—Chromic acid is destructive to all lower forms of life. It is one of the strongest coagulants of albumen, and applied to the skin is exceedingly corrosive, producing a deep eschar, which falls off in about two days, leaving a granulating base which heals readily. When pure it causes but little pain. Swallowed, chromic acid destructively corrodes the mucosa over which it passes and may cause perforation of the stomach. Intense pain in throat and stomach and bloody vomiting and purging are the chief symptoms. Death has resulted from its too free use upon condylomata of the vulva and buttocks. The treatment of poisoning by it is that for toxic gastro-enteritis—emesis, or better lavage, with soap, alkaline carbonates, or heavy magnesia in large quantities of milk. Demulcents and pain-relieving agents may be used in the after-treatment. Workmen who handle the acid are often the subjects of nasal septum perforation through accidental contact with the agent.

Therapy.—*External.* A dangerous, though effective, stimulating disinfectant for indolent and syphilitic ulcers, employing solutions of from 1/2 to 1 per cent. The latter are especially valued by some for the mucous patches of syphilis. It should be used only upon very small areas. Its

chief use, and it is very effective, is to remove dermal growths, particularly corns and warts. A 25 per cent solution is mostly employed for this purpose. It should be applied preferably with a glass rod. The chief reason for including chromic acid in this work is to call attention to its poisonous effects and their treatment, as the acid constitutes the chief ingredient of the "corn cures" of itinerant vendors.

CHROMII SULPHAS.

Chromium Sulphate, Sulphate of Chromium. (Formula: $Cr_2 (SO_4)_3$. $18 H_2 O$.)

Description.—Odorless, violet crystals, soluble in hot and cold water and alcohol. The solution in cold water has a violet color; when dissolved in hot water or alcohol the color is green. *Dose*, 4 to 20 grains.

Specific Indications.—Fibroid degeneration; neurotic tendency.

Therapy.—Chromium sulphate is a comparatively new remedy and is still under trial. It seems to be useful in fibroid degeneration and in neurotic or neurasthenic tendency. Chronic interstitial nephritis is not curable, for the destroyed renal glomeruli can not be replaced. Still many of the unpleasant symptoms can be relieved and the sound portions of the kidneys be conserved and made to functionate better by close attention to diet and care, and the judicious use of suitable medicines, of which there are not many for this purpose. Dash, from several years use of chromium sulphate, in 4 grain doses 4 times a day, has been able in many cases to lessen the excessive output of urine, raise the specific gravity, lower blood pressure, and improve the general condition of the patient. For its use in exophthalmic goitre he does not speak so encouragingly as others, some of whom laud it for its control over the tachycardia particularly. In enlarged prostate it seems to have reduced the size of the gland, with amelioration of the urinary obstruction, patients that have been catheterized daily having been enabled, after a few months use of chromium sulphate, to urinate freely in the normal way. It should be further studied for its effects in neurasthenia.

CHRYSAROBINUM.

Chrysarobin.

A mixture of principles derived from Goa Powder (a deposit in the wood of *Vouacapoua Araroba* (Aguiar), Druce. Nat. Ord. Leguminosæ.

Description.—A very irritating tasteless and odorless micro-crystalline brownish to orange-yellow powder; soluble in chloroform and ether, less easily in alcohol, and practically insoluble in water. *Dose*, 1/30 to 1 grain; seldom used internally.

Preparation.— *Unguentum Chrysarobini*, Chrysarobin Ointment (6 per cent).

Action.—Chrysarobin is a deep-acting and powerful local irritant and vegetable parasiticide. It produces erythema and inflammation and sometimes furuncular dermatitis, with subsequent desquamation. If applied to the face it may cause palpebral œdema and conjunctivitis. It is probably somewhat absorbed and may irritate the kidneys also, occasioning albumen in the urine. Chrysarobin stains the skin a dull yellowish or purplish brown, and the hair a yellowish color. If no soap or alkali has been previously used the stain may be removed by a weak solution of chlorinated lime (bleaching powder). It is intensely destructive to fungous organisms. Taken internally it may induce a vicious watery diarrhœa, with repeated vomiting. It imparts to the urine a yellow color.

Therapy.—*External.* This agent, often under the wrong name of chrysophanic acid, is used, like araroba, from which it is obtained, upon skin diseases caused by the vegetable fungous parasites—notably those of the ringworm group. When it can be avoided it should not be used upon the face or scalp on account of the irritation it produces and its possible inflammatory effects. If, however, failure to destroy tinea, when occurring in these regions, is the result of the use of other agents, chrysarobin may be employed as a last resort. It should be carefully applied only to the diseased part. Ointments have been used, but they are less manageable than solutions, and the official ointment is many times too strong for safety. Wilcox advises a solution of 1 part of chrysarobin in 7 parts of chloroform, into which an equal quantity of petrolatum is stirred. This may be applied accurately with a brush and by being more easily limited lessens the staining. The diseases in which it may be used are tinea tonsurans, tinea circinati, mentagra, psoriasis (said to be the best local application), and in acne rosaceæ. The parts should be thoroughly washed to remove grease and scales before applying chrysarobin. If soap has been used it should be removed with alcohol before making the application, lest coloration be intensified. Chrysarobin is especially valuable in ringworm of the scalp and in alopecia circumscripta, but must be used with extreme care for fear of producing intense inflammation. It has been applied also for the destruction of pediculi, but we have other equally efficient and far safer parasiticides.

CINCHONA.

I. Cincnona.—The dried bark of *Cinchona Ledgeriana*, Moens; *Cinchona Calisaya*, Weddell, and hybrids of these with other species of Cinchona yielding not less than 5 per cent of cinchona alkaloids. (Nat. Ord. Rubiaceæ.) South American Andes, wild and to some extent cultivated in South America; cultivated in Java, India, Jamaica, and other countries. *Dose*, 1 to 30 grains.

II. Cinchona Rubra.—The dried bark of *Cinchona succirubra*, Pavon, or of its hybrids yielding not less than 5 per cent of alkaloids of Red Cinchona (Nat. Ord. Rubiaceæ), Ecuador.

Common Names: (1) Yellow Peruvian Bark; (2) Red Cinchona Bark.

Principal Constituents.—*Quinine*, quinidine, cinchonine, cinchonidine—all important crystalline alkaloids; quinamine, an important alkaloid; kinic (quinic) acid, kinovin (quinovin), cinchotannic acid (astringent); cinchona red (coloring agent); and a volatile oil (aroma).

Preparations.—1. *Specific Medicine Cinchona. Dose*, 1 to 30 drops. (This preparation is prepared from *Cinchona Calisaya* or Calisaya Bark.)

2. *Fluidextractum Cinchonæ*, Fluidextract of Cinchona. *Dose*, 5 to 30 drops.

3. *Tinctura Cinchonæ*, Tincture of Cinchona. *Dose*, 10 to 60 drops.

4. *Tinctura Cinchonæ Composita*, Compound Tincture of Cinchona. (Red Cinchona, Bitter Orange Peel, Serpentaria.) A modern substitute for and sometimes wrongly called "Huxham's Tincture of Bark". *Dose*, 5 to 60 drops.

Specific Indications.—Periodicity and, like quinine, effective when the pulse is soft and open, the tongue moist and cleaning, the skin soft and moist, and the nervous system free from irritation. (If opposite conditions prevail, cinchona will be likely to aggravate.) Empyema; gastric debility; anemia and debility from chronic suppuration; afternoon febrile conditions, weakness, with pale surface, loss of appetite, feeble digestion, and deficient recuperative powers.

Action and Therapy.—(See also *Quininæ Sulphas.*)—*External.* Antiseptic and astringent. A poultice of the bark has been successfully used

upon fetid and gangrenous ulcers, and where such an application has been thought necessary upon suppurating and sloughing felons.

Internal. Cinchona is tonic, antiperiodic, slightly astringent, and mildly antiseptic. In small doses it is a good stomachic, but must not be long continued. Large doses irritate and cause an unpleasant excitement of the stomach and bowels, with retching and vomiting. It has occasioned symptoms closely resembling the paroxysms of intermittent fever, and produces a general state known as *Cinchonism:* Throbbing headache, tinnitus aurium and temporary deafness. Outside of a slight astringent effect, the action of Cinchona is that of its chief alkaloid, quinine (see *Quininæ Sulphas*), which has completely supplanted the bark in almost all conditions in which the former was once used. While cinchona will accomplish the same results as quinine, the latter is more prompt and direct and more easily administered.

Cinchona is useful in functional derangements of the stomach, improving digestion, and imparting vigor and tone to the nervous and muscular systems in diseases of general debility and in convalescence from exhausting illness. While for some unexplainable reason occasionally acting more advantageously in malarial fevers than quinine itself, in most instances the alkaloidal salts have almost entirely supplanted cinchona in these disorders. Cinchona may be used in preference to its alkaloids when a tonic effect only is required and periodicity is lacking, or after hemorrhages or exhaustive discharges, as in empyema, or when an astringent tonic is needed; in the debility following low and exhausting fevers; in anemia and debility from chronic suppuration; and to arrest profuse and debilitating night sweats in one suffering from general debility with poor recuperative powers.

The same indications and contraindications should be observed as for the administration of quinine, which see.

CINNAMOMUM.

I. Cinnamomum Saigonicum. Dried bark of an undetermined species of *Cinnamomum.* Chiefly from China.

II. Cinnamomum Zeylanicum. Dried bark of cultivated *Cinnamomum zeylanicum,* Breyne. (Nat. Ord. Lauraceæ.) Ceylon.

Common Names: Cinnamon; (1) Saigon Cinnamon; (2) Ceylon Cinnamon.

Principal Constituents.—A volatile oil (*Oleum Cinnamomi*), tannin, and sugars. (Oil of Cinnamon of medicine is Cassia Oil (*Oleum Cassiæ*) derived from *Cinnamomum Cassia* (Nees), Blume.)

Preparations.—1. *Specific Medicine Cinnamomum. Dose,* 5 to 60 drops.

2. *Oleum Cassiæ,* Oil of Cinnamon (Cassia Oil), a yellowish or brownish fluid becoming darker and denser by age and exposure, and having the odor and taste of cinnamon. *Dose,* 1 to 5 drops.

Specific Indications.—Passive hemorrhages.

Action and Therapy.—Cinnamon is an aromatic stimulant, carminative and astringent. Besides it possesses marked internal hemostatic power. That this is not wholly due to the tannin contained in the bark is shown by the prompt action of the tincture of the oil. Oil of Cinnamon has properties which make it nearly specific for certain conditions. While no tests have been made that convinces one of its power over germ-life, there seems to be no question that some such germicidal action is exerted by it in acute infections, as "common colds," and as la grippe or epidemic influenza.

Aromatic bodies, like cinnamon and camphor, have been overlooked in recent years, though the use of the latter has been revived as an antiseptic stimulant in pneumonia. That they possess antibacterial virtues we believe will be found true should investigations be made of them in that line. Cinnamon imparts a flavor to unpleasant medicines and may be used to preserve them from rapid changes. Medicines dispensed in but few drops in a half glass of water will not keep sweet long at any time and will quickly sour in summer time. A few drops of Specific Medicine Cinnamon added to such mixtures give an agreeable sweetness and aroma and will help the medicine to preserve its balance for several days. Children invariably like the flavor. Even cinnamon can be overdone, however. It should not be added day after day for a long period lest the stomach revolt and the taste recoil. Nor should much be put in mixtures for little children, for if overdone it smarts the mouth severely; nor should it be employed when the mouth is irritated or ulcerated. When too much has been added the oil of cinnamon separates and floats upon the surface, and if thus given it is decidedly irritant. If the medicine to which it has been added in over-amount is too valuable to throw away, the excess of cinnamon may be easily removed by lightly sweeping over the surface with a clean piece of bibulous paper—blotting paper or filter paper—or a firm, non-crumbling piece of bread.

Cinnamon is frequently employed as an ingredient of mixtures to restrain intestinal discharges, and the powder with or without chalk or bismuth, or its equivalent in infusion has long figured in the treatment of diarrhœa and acute dysentery, though it does not equal in the latter condition other agents which we now use specifically. In diarrhœa it should be used in small doses if of the acute type, and in large doses in chronic non-inflammatory and non-febrile forms. It warms the gastro-intestinal tract and dispels flatus, being decidedly useful as a carminative. It has the advantage of preventing griping when given with purgatives, and it enters into the composition of spice poultice, a useful adjuvant in the treatment of some forms of gastro-intestinal disorders.

Cinnamon has been proved in Eclectic practice to be a very important remedy in hemorrhages. It acts best in the passive forms. The type of hemorrhage most benefited is the post-partum variety, though here it has its limitations. If the uterus is empty and the hemorrhage is due to flaccidity of that organ due to lack of contraction, then it becomes an important agent. Then it strongly aids the action of ergot and should be alternated with it. If retained secundines are the provoking cause of the bleeding, little can be expected of this or any other agent until the offenders have been removed. Cinnamon should be frequently given, preferably a tincture of the oil, though an infusion might be useful, but it cannot be prepared quickly enough or be made of the desired strength. Specific Medicine Cinnamon is a preferred preparation. Oil of erigeron acts very well with it. In menorrhagia, even when due to fibroids and polypi, it has had the effect of intermittently checking the waste: but only a surgical operation is the rational course in such cases.

Other hemorrhages of a passive type are benefited by cinnamon. Thus we have found it a very important agent in hemoptysis of limited severity. In such cases we have added it to specific medicine ergot and

furnished it to the patient to keep on hand as an emergency remedy. By having the medicine promptly at hand the patient becomes less agitated or frightened, and this contributes largely to the success of the treatment. Rest and absolute mental composure on the part of the patient and the administration of cinnamon have been promptly effective. If not equal to the emergency, then a small hypodermatic injection of morphine and atropine sulphates will usually check the bleeding. When used with ergot in pulmonary hemorrhage probably more relief comes from the cinnamon than from the ergot, for ergot alone is far less effective. We are told that ergot does not act as well in pulmonary bleeding as in other forms of hemorrhage because of the sparse musculature and poor vaso-motor control of the pulmonic vessels. But cinnamon has given results which have been entirely satisfactory. Hemorrhages from the stomach, bowels, and renal organs are often promptly checked by the timely administration of cinnamon.

COCA.

The dried leaves of *Erythroxylon Coca*, Lamarck, and its varieties. (Nat. Ord. Erythroxylaceæ.) South American Andes—Peru, Bolivia, and Chili. *Dose*, 60 to 240 grains.

Common Name: Coca.

Principal Constituents.—*Cocaine* (erythroxyline—see *Cocaina*).

Preparation.—*Fluidextractum Cocæ*, Fluidextract of Coca. *Dose*, 5 to 30 minims.

Specific Indications.—Defective innervation, with dizziness; impaired digestion; pain in back of the head, and fatigue; gastric pain; inordinate hunger and thirst; exhaustion during convalescence from long illness.

Action and Therapy.—The action of coca depends very largely upon the cocaine it contains, therefore the physiological effects are recorded under that subject (see *Cocainæ Hydrochloridum*). From time immemorial the people of the Andes, particularly in Peru, Bolivia, and Chili, have used coca leaves as other nations use stimulating table beverages; and when undergoing long journeys and hard work the natives are accustomed to chew the leaves with lime or some other alkaline substance, in order to endure hunger and fatigue, which it enables them to do with remarkable certainty. These uses of the plant led to its adoption into medicine as a remedy for neurasthenia and other disorders, with nervous weakness and muscular debility.

Coca is a remedy to be used temporarily only for defective innervation. Though the appetite is apparently normal, digestion is imperfect, and there is an associated occipital and post-cervical pain, dizziness, and inability to stand for any great length of time. The mental faculties are sluggish and tired—brain fag—and thinking is difficult and despondency a common condition. If there is gastric pain or discomfort it is relieved by coca probably through the obtunding power of cocaine upon the nerve filaments of the stomach. As compared with cocaine this power is feeble, as is coca in all its effects, still there is sufficient of the alkaloidal influence exerted to make coca a remedy to be used with great circumspection. In nervous debility it may be carefully employed for a brief period, especially in convalescence from exhausting fevers and other diseases in which a persistent nervous depression follows. While of some value in chorea and repeated attacks of hysteria, it should not be used when any other agent can

be made to serve the purpose. In fact, there is no more wisdom or justification in employing coca preparations for simple functional maladies because of mere nervous discomfort than there would be in prescribing opium for similar purposes. Both lead to pernicious habits, with a train of miseries to which the victim finally succumbs.

An occasional dose of 10 to 15 drops of the fluidextract will sometimes overcome insomnia caused by gloom and worry, and very rarely it helps one over an attack of asthma. It may be used for any length of time desired in gastric carcinoma to relieve the irritability and pain. Its chief use, if employed at all, will be for very temporary exhibition in the debility following fevers, or for a more prolonged use in advanced phthisis, to give rest, quiet gastric irritability, and aid breathing. For all prolonged states of mental depression, as neurasthenia, hypochondria, melancholia, depressive insanity, etc., its administration should not be encouraged, and as a remedy for the opium and other drug habits it has no place in medicine on account of the habit-forming dangers of coca itself.

To sum up some of the beneficial results of temporary coca medication would be to include its influence as a circulatory and respiratory stimulant, a restorative of strength after exhaustive acute diseases or operations, in sudden nervous exhaustion and insomnia, in painful indigestion, headache from exhaustion, and in migraine. In all of these it should be used for but short periods, and any symptoms of cocainism should be a warning to cease its administration. The fluid medicines may be used in moderate doses. The habit of using coca wines is but a mild form of cocaino-alcoholic tippling.

COCAINA.

Cocaine.
(Formula: $C_{17}H_{21}O_4N$).
An alkaloid derived from *Erythroxylon Coca*, Lamarck, and its varieties. (Nat. Ord. Erythroxylaceæ.)

Description.—Large odorless and colorless crystals or a crystalline white powder. Soluble in chloroform, ether, alcohol, and olive oil; sparingly dissolved by water. *Dose* (maximum), 1 grain; as a rule the dose should not exceed 1/4 grain; and never more than that as an initial dose.

Action and Therapy.—(See Cocainæ Hydrochloridum.)

COCAINÆ HYDROCHLORIDUM.

Cocaine Hydrochloride.
(Formula: $C_{17}H_{21}O_4N$. HCl.)

Description.—Permanent odorless transparent crystals, lustrous flakes, or as a white crystalline powder. Very soluble in water or alcohol; and less readily in chloroform. *Dose* (maximum), 1 grain. The usual dose should not exceed 1/4 grain, and never more than this amount as an initial dose.

Specific Indications.—To produce local anæsthesia; to facilitate examinations and to perform minor operations; intractable vomiting; pain of gastric cancer.

Action.—Coca and its alkaloid, cocaine, administered internally induce a certain degree of exhilaration and a sense of pleasure and enable one to do an increased amount of physical and mental labor. Full doses of cocaine particularly cause, in the beginning, a state of cheerfulness and contentment in some cases, of restlessness, nervous excitement, fear and terror in others. Sometimes there is a feeling as of passing from earth into the air.

When consciousness becomes lost, the unconscious state may be only apparent but rather an anæsthetic condition. When the stage of cheerful inebriation occurs, insensibility to hunger and the power to endure fatigue are strikingly displayed and muscular power is undoubtedly increased. The record of cocaine is one of stimulation and depression. Small and moderate doses stimulate, large doses depress, while lethal doses paralyze. Locally applied, cocaine is a profound anæsthetic acting by depressing the sensory nerve endings. When so used even small doses produce complete analgesia and restricted anæsthesia.

Taken internally, cocaine, by a series of activities involving the vagal and sympathetic cardio-inhibitory centers, the heart muscle itself, and probably the vascular walls, increases and then slows the pulse rate, and heightens and afterwards lowers arterial pressure. The depth and rate of breathing are increased by small doses, while large amounts depress and finally paralyze, so that death results from respiratory failure. While the cerebrum is strongly attacked by cocaine the spinal cord is but little affected, large doses being required to depress the sensory tract sufficient to produce local anæsthetic or even analgesic effects. It differs very markedly in this respect from the results obtained when subcutaneously injected, or when applied to the mucosa. Voluntary muscular tissue is stimulated by cocaine so that enormous physical tasks may be accomplished. Peristalsis is first excited and then restrained by it, the renal functions are but slightly affected, tissue-waste is lessened, and if the dose be very large the temperature is greatly increased. Small doses powerfully excite the cerebrum, inducing mental exhilaration, with a mild sense of contentment and ease, increased intellectual activity, and a stimulated imagination. If carried too far a cheerful inebriation and delirium result. Lethal doses, however, depress the cerebral centers, and stupor and epileptoid convulsions occur. Cocaine decreases the elimination of urea, and the drug is mostly oxidized in the body, that which is excreted passing out by way of the renal organs. Scarcely any effect is produced by cocaine when applied to the unbroken skin. Injected subcutaneously or applied to the mucosa, cocaine is a *powerful local vaso-constrictor*, producing very great ischæmia, followed after a time by vascular relaxation and local congestion. Very quickly complete analgesia and anæsthesia result, so that absolutely no pain is experienced from cutting operations, though tearing is said to be felt severely. Neither does it alter the sense of cold and heat, for unwarmed instruments applied to the anæsthetized parts are distinctly felt. The combined action upon the sensory terminals, the vaso-constriction, and the local pressure œdema when injected *into* (not beneath) the skin, contribute to produce the anæsthesia. The parts are first blanched, but as the effects wear off they become decidedly reddened, owing to the secondary dilatation of the blood vessels. The amount required to affect the mucosa depends entirely upon the density of the tissues, the delicate structures of the conjunctiva favoring rapid absorption and the denser mucosa of the vagina, rectum, and urethra being affected very much more slowly. For some reason its use in the urethra has been attended with poisonous consequences more often than in any other region of the body. In addition to anæsthesia strong but comparatively transient mydriasis is produced by cocaine with but very

little disturbance of accommodation. If used too strong or too often it has a tendency to dry and otherwise damage the corneal epithelia.

Toxicology.—Acute cocaine poisoning varies in different individuals. It usually includes the following phenomena: Nausea and vomiting, and if the patient is still conscious, a sensation of heat and dryness of the mouth and throat; pulse very rapid, small and thready, or slow and feeble, with cyanosis. At first respiration is quickened, but finally becomes slower and shallow and labored. There is great mental and nervous excitement, muscular trembling and epileptiform convulsions, sometimes hallucinations, dizziness, and violent headache occur. Stupor takes place and breathing ceases, centric paralysis having resulted in asphyxia.

The treatment consists in inhalations of amyl nitrite or chloroform and the administration of chloral and bromides to control the convulsions; and the use of ammonia, ether, and strychnine or atropine to support the failing circulation and respiration. Morphine is said to be a perfect antidote to poisoning by cocaine.

Chronic Cocainism (Cocamania). Cocaine habitués suffer from a miserable drug intoxication equally, if not more disastrous, than that resulting from opium. The victim has unexplained attacks of pyrexia, is emaciated and feeble, and suffers from various disturbances of the circulation. The mind becomes weak and erratic, the victim sleeps poorly and often is troubled by persistent wakefulness, disagreeable visual and mental hallucinations and delusions, and sinks into the utmost depths of moral degradation. Like all kinds of drug fiends, his word is absolutely not to be relied upon, particularly when it concerns his habit. Delirium and acute mania are not uncommon results, and crimes of the most dangerous and revolting character are committed upon sudden impulse. Cocaine habitués are said to suffer a peculiar dermal formication like that of crawling or creeping insects or worms beneath or upon the skin. This state is known in slang parlance as "cocaine bugs." Cocaine should not be abruptly withdrawn from these victims lest they suddenly collapse. Institutional treatment is the only possible way of handling cocamania. Singularly many physicians, who should know better, become cocaine fiends chiefly through its local self-use in nose and throat treatment. Cocaine fiends are often the victims of the conjoint habitual use of opiates, alcohol, and cocaine—the most horrible drug trinity—and the most pitiable of all drug-afflicted creatures.

Therapy.—*External and by Injection.* Cocaine, and its substitutes, especially procaine, are the most important of the local anæsthetics. They may be applied to mucous surfaces or to denuded parts, or injected hypodermatically wherever the circulation can be controlled by ligature or otherwise. Of cocaine, solutions of from 1 to 6 per cent are used, but for most purposes the 2 or 3 per cent solutions mostly are employed. While sometimes used to relieve local pain and reduce venous turgesence, it acts poorly where there is much inflammation. When injected into inflamed parts it is much more difficult to obtain complete anæsthesia.

Cocaine is the most important anæsthetic for use upon the eye, for the purposes of controlling pain or photophobia, to render the removal of foreign bodies painless, and to prepare the ocular field for superficial and deep operations. Iridectomy, cataract operation, ocular tumors, and

trachomic masses may be removed absolutely without pain under its effects, except that a sharp sting may be felt when the iris is withdrawn and snipped in iridectomy. From 3 to 4 drops of a 1 to 4 per cent (2 or 3 per cent usually preferred) solution may be instilled into the eye every 3 or 4 minutes until the field is anæsthetized. Stronger solutions should not be used, nor should cocaine instillation be frequently repeated on account of the corneal degeneration that sometimes results from it, probably through the ischæmic effects on the conjunctival blood-supply, and the drying of the corneal layers. Under cocaine anæsthesia most of the operations upon the eye, ear, nose, and throat may be performed with facility.

Cocaine, and preferably procaine, may be used to anæsthetize the field of operation for the opening of mammary and other abscesses, the removal of small tumors and growths, for the amputation of the fingers and toes, and sometimes for the repair of hernia. With cocaine, wherever it is possible, a rubber band should be made to constrict the parts and thus confine the circulation within the operative area. After completing the operation the band should be allowed to remain *in situ* for a short while, and the imprisoned blood supply allowed to drain from the parts, thus minimizing the chances of cocaine absorption. As a rule, not over 1/4 to 1/2 grain of cocaine should be employed. If a 1 to 10,000 or 20,000 adrenalin solution be used with the cocaine, less bleeding while operating is likely to occur and anæsthesia is more readily maintained. Cocaine, as a rule, should be used only where small incisions or operations are to be performed. Rarely, however, in profound illness and in emergencies the abdomen may be opened under cocaine, or preferably, procaine anæsthesia. Moreover, for many of the operative procedures, excepting those of the eye, procaine (novocaine) has largely supplanted the use of cocaine.

Incisions are best performed under preliminary preparation by the *Infiltration Method of Schleich.* This consists in the injection, by the hypodermatic needle, of a special preparation of cocaine *into* the skin, point by point, so that the resulting wheals overlap one another. In this way the combined effect of local pressure œdema, contraction of the vessels, and the obtunding effects of the cocaine, render the line of punctures a perfectly anæsthetic field for incision. The injection must be made *into* and not *through* the skin. After the surface is so prepared deeper injections may be made, if desired. Schleich advised solutions of three strengths, varying only in the quantity of cocaine hydrochloride used:—weak (1/10 grain); medium (1 grain); and strong (2 grains). These are respectively dissolved in 2 fluidounces of a sterile solution of 1/5 grain of morphine hydrochloride and 2 grains of sodium chloride. The medium strength solution is that usually employed. This method is especially advised for incisions where it is difficult to confine the circulation to a restricted area.

All sorts of dental surgery, from the extraction of teeth and bony spiculæ to obtunding cavities for filling, as well as most operations upon the nose, ear, and eye, may be done under cocaine anæsthesia; and some varieties of vaginal plastic work may be successfully accomplished with its aid. In most severe operations, however, general anæsthesia is to be preferred; and especially if the individual is of a very nervous temperament, though no pain is felt, for consciousness of the fact that an operation is

being performed and an apprehension of harm may interfere greatly with the success of the work of the operator. Cocaine anæsthesia should not, as a rule, be used upon children, where fear may prevent successful operative results even though the pain is obtunded; nor is it advisable to risk its use upon hysterical individuals. Cocaine is invaluable sometimes to desensitize passages, so that instruments may be passed readily and examinations facilitated.

The use of cocaine to reduce turgescence of the turbinates and mild local inflammations, and in other hyperæsthetic conditions of the nose, as in hay fever, is effectual, but should be largely discouraged. Under no circumstances should the patient be furnished with cocaine solutions or ointments, with a knowledge of the identity of the drug; it is better that the physician make such applications himself and then he can control the amount and the length of time they are to be used. The cocaine habit has been most readily and most generally acquired under the use of the drug as a nasal medicament.

While cocaine is a mydriatic, it is not generally employed as such except for the purpose of examining the fundus of the eye when it is desirable not to have the pupil dilated for a long period. For most refraction work homatropine hydrobromide or atropine sulphate is to be preferred. Cocaine mydriasis lasts about a day, and unlike that caused by atropine can be overcome at once by the instillation of a few drops of a 1/2 per cent solution of eserine. Nor is cocaine of much value in iritis, because it does not produce forcible dilation of the iris with the same persistence that atropine does.

Internal. The cocaine habit is readily acquired and not easily broken. Therefore cocaine should have little part in internal medication or be long applied where absorption can take place to the detriment of the patient. The Eclectic profession has been insistent in its opposition to the free and reckless use of habit-forming drugs, hence the internal use of cocaine has found little favor with it, notwithstanding its efficiency as a respiratory and cardiac stimulant and to relieve local irritation and pain of the gastric mucosa. Rarely it may be employed to control intractable vomiting, as in sea sickness and malignant diseases of the stomach. Its use is justified in yellow-fever to control emesis. While it may relieve the vomiting of pregnancy (applied locally to the os uteri at the same time), it should only be temporarily employed when other means have been exhausted. It will relieve the pain of gastric ulcer and cancer of the stomach, but it takes almost poisonous doses to produce such effects. In the latter its use is justifiable, as it may be in any incurable condition, in which life can last but a short time, and in which it can give any relief from suffering. In the adynamia of low fevers it has a stimulating effect, and if the usual means fail to arouse the depression a single dose is not inadmissible; the same is true in angina pectoris, and in the adynamic stage of pneumonia in the aged, when it will assist the action of strychnine. It should never be used, as has been advised, in hypochondria and neurasthenia and other depressive mental states, and as a remedy to cure the alcohol and opium habits it has nothing to commend it, as such a continuous use of it is sure to establish the cocaine habit, equally as pernicious as those it is sought to cure.

COCAINE SUBSTITUTES.

Since the introduction of cocaine for local anæsthesia the latter has come into extended use through rapid evolution of methods and substitutes. The first of these was eucaine, not much employed now. By all odds the best and safest is procaine (novocaine), except for instillation into the eye or in operations upon the nose and throat. Owing to the fact that it only produces complete anæsthetic effects when injected, it is unsuitable and insufficiently effective when merely applied to the conjunctiva and the nasal mucosa. (See below.)

Quinine and Urea Hydrochloride (Quininæ et Ureæ Hydrochloridum), having the appearance and taste of quinine, very soluble in water or alcohol, is administered hypodermatically in the average dose of 15 grains once a day. It should be largely diluted and even then is said to be slowly absorbed and not wholly free from causing irritation, and sometimes tetanus. The intravenous use is preferred by some operators. It has found favor as a remedy for the shrinkage of internal piles.

Procaine (discarded German name, Novocaine) is a colorless crystalline synthetic soluble in water and sterilizable without change. Less powerful and more transient in anæsthetic effect, it is also accepted as being but one-seventh as poisonous as cocaine, and one-third as toxic as eucaine. However, by delaying its absorption by its conjoint administration with adrenalin it is apparently as efficient as cocaine for general purposes. Its effects are confined to the nerves solely and does not include the neighboring tissues. Neither does it cause marked irritation, hyperæmia, constriction of the blood vessels, or mydriasis. This makes it in many respects, together with its relative lower toxicity, preferable to cocaine, except in eye, nose, and throat work. In fact, procaine is fast displacing cocaine as a local anæsthetic, being now preferred by surgeons for even quite extensive operations, even to abdominotomies. Procaine is employed almost exclusively as a substitute for cocaine to produce local anæsthesia, by topical and tissue infiltration and intraspinal methods. As with other anæsthetics, the latter is inadvisable. For extensive tissue infiltration a normal saline solution of 1/4 to 1 per cent of the drug is employed, usually with adrenalin. For ocular work, 1 to 10 per cent; nasal treatment, 5 per cent; mouth and throat, 5 to 15 per cent; and intraspinally from 30 to 45 mimins of a 5 per cent solution.

Eucaine. Two preparations, *Eucaine "A"* and *Eucaine "B"*, have been used as substitutes for cocaine.

Eucaine "A" is a white, crystalline powder, neutral, and soluble in water. It is claimed that it is less toxic than cocaine, though the maximum dose (3/4 grain) of the latter should not be exceeded. The solution does not, it is asserted, decompose, and may be sterilized without injury. Claimed of less value for ocular work than the Eucaine "B", on account of the irritation and hyperæmia produced. The following strengths of solutions are directed: Diseases of nose, throat, and ear, 2 to 8 per cent; dentistry, 4 to 9 per cent; minor surgical operations, 5 per cent; solutions of greater than 9 per cent strength deposit crystals of the drug.

Eucaine "B" (*Beta Eucaine*) is crystalline, white, neutral, and soluble in about 28 parts of water; hot water dissolves it more readily. Solutions non-decomposable and not affected by sterilization. Claimed to be slightly antibacterial, less toxic than Eucaine "A", and less than half as poisonous as cocaine; does not cause mydriasis and corneal, or accommodation disturbances (as cloudiness of the cornea), but little vascular injection, etc. The strength of solutions recommended are: For ocular use, 1 to 2 per cent, about 4-drop instillations shortly before operations, prolonged and repeated applications producing untoward effects; infiltration anæsthesia, 1/10 to 1 per cent; genito-urinary disorders, 1/2 to 2 per cent.

Though conceded to be less toxic than cocaine, eucaine is reported to have produced intoxication through the application of 4 per cent solutions to the throat, such a case exhibiting "spasmodic muscular contractions of the arms and legs"; "the heart's action was also affected, the pulse becoming rapid and small." Nearly as efficient as cocaine; some regard eucaine as too irritating for ordinary application to the eye. The greatest advantage, it is conceded, is its value when desirable to avoid pupillary dilatation, as in the removal of foreign bodies (the iris acting as a background in light-colored eyes, thus aiding in the detection of the particle), and for use upon the eyes of the elderly with "glaucomatous tendency." It has one advantage in nasal operations, in that, by not causing shrinkage, it allows the operator to ensnare posterior hypertrophies of the inferior turbinated bone, being useful as well in anterior hypertrophies. Cocaine produces a marked shrinkage of the tissues. The hydrochloride and lactate of beta eucaine are the preparations employed.

Tropa-cocaine.—Tropa-cocaine is an alkaloid isolated by Giesel from the narrow-leaved variety of *Erythroxylon Coca*, Lamarck, grown in Java. It is also prepared synthetically. The hydrochloride is principally used. It occurs in colorless crystals, soluble in water, the

solution being (claimed) more stable than the corresponding solution of cocaine hydrochloride. It is reputed a local anæsthetic, differing in action from cocaine and other local anæsthetics in not producing irritation, hyperæmia (occasionally slight and transient hyperæmia), or ischemia; furthermore, it is said to be less toxic and depressing to the cardiac ganglia and to the heart. But little or no mydriasis results from its use. Anæsthesia is quickly produced, according to Silex, tenotomy having been painlessly performed in less than one-half minute after the application of a 3 per cent solution of the hydrochloride. The usual method of exhibition is the 3 per cent solution of tropa-cocaine, in a 0.6 per cent sodium chloride solution, 1 or 2 drops being instilled into the eye. It is scarcely used for any other purpose nowadays except for producing spinal anæsthesia—a dangerous procedure not to be encouraged, as the proportion of deaths has been about 1 to 750.

Apothesine has been introduced as even less toxic than procaine, and to be used exactly like the latter, with or without adrenalin. It has not, at this date, come under the ban of the antinarcotic law, and is said not to produce a habit. Apothesine occurs in snow-white crystals easily dissolved by water or alcohol, and is sterilizable without decomposition, upon boiling. Normal saline solutions in 1 to 2 per cent strengths are employed.

Holocaine, a derivative of phenetidine, is said to have double the anæsthetic power and to be less toxic than cocaine. It is also said to be a useful and unappreciated preparation. It acts quickly upon the conjunctiva, without causing vascular constriction or secondary hyperæmia, does not dilate the pupil, change intraocular tension, nor unpleasantly affect the corneal epithelium; hence its reputed value in keratitis and iritis. The crystalline hydrochloride only is soluble and should be freshly prepared and sterilized.

Anæsthesine is a substitute claimed to be efficient and far less poisonous than cocaine.

Stovaine, a synthetic alkaloid, occurring in brilliant scales and very soluble in water, is reputed equal in anæsthetic power to cocaine, and its solutions can be boiled without decomposition. It has produced excessive sweating, headache, vomiting, and relaxation of the sphincters. One (1) per cent in normal salt solution is used by subconjunctival injection, and a 4 per cent solution for instillations. It has been employed with disastrous results in spinal anæsthesia, bringing the drug and the method into discredit. It is not much employed.

Alypin, or benzoyl mono-hydrochloride, is a white crystalline powder readily soluble in water. It is equal in anæsthetic power to cocaine, but like the latter it produces secondary congestion. Its solutions may be boiled, but not longer than five minutes. Claimed not to irritate, constrict the local vessels, or cause either mydriasis or change of accommodation. Solutions of 2 per cent strength are used in ocular therapeutics; of 10 per cent, in other operations. As it is equally as toxic as cocaine and is said to produce sloughing, it has acquired but little popularity among surgeons and oculists.

COCCULUS

The seeds of *Anamirta panniculata*, Colebrooke (Nat. Ord. Menispermaceæ.) East India.

Common Names: Fishberries, Indian Berries. **Synonym:** Cocculus Indicus.

Principal Constituent.—*Picrotoxin*, a neutral and extremely poisonous principle. (See *Picrotoxinum*.)

Preparation.—*Unguentum Cocculi*, Ointment of Cocculus Indicus. (Cocculus, crushed, 1 ounce; benzoinated lard, 8 ounces; fractionally added until well incorporated.)

Action and Therapy.—*External.* (See also Picrotoxinum). A violent, poisonous parasiticide for animal and vegetable parasites, to destroy head lice and the itch mite, and relieve scald head, sycosis barbæ, trichophytosis, tinea versicolor and other parasitic skin diseases. Included in this book chiefly because of the possibility of meeting with cases of poisoning by it, as the berries, in ointment or whisky tincture, are often used by the laity for the destruction of lice. It must not be used on abraded surfaces, nor in any considerable quantity.

Internal. Homeopaths use an attenuation of the tincture of cocculus as a remedy to prevent nausea and sickness incident to travel by rail or upon water (meralgia or sea sickness).

Cocculus is said to be used by the natives of the East Indies to stupefy fish, so as to readily catch them, and it is asserted to be in use among brewers to add bitterness to beer and other malt beverages.

CODEINA.

Codeine, Methyl morphine.

An alkaloid prepared from Opium, or prepared by methylation from morphine.

Description.—Translucent, colorless crystals or a white crystalline powder, odorless and of a faintly bitter taste. It slightly effloresces in warm air. Soluble in water and more readily in alcohol. *Dose*, 1/8 to 1 grain.

Preparations.—1. *Codeinæ Sulphas*, Codeine Sulphate. (Quite soluble in water (30); very sparingly in alcohol). *Dose*, 1/8 to 1 grain.

2. *Codeinæ Phosphas*, Codeine Phosphate. (Very soluble in water (2.3)). *Dose*, 1/8 to 1 grain.

Specific Indications.—A calmative where opium is apparently indicated, but not well tolerated; insomnia due to cough; cough constant and irritating; abdominal pain; diabetes.

Action and Therapy.—Codeine is anodyne and hypnotic. It restrains the output of urine in polyuria and the amount of sugar in diabetes. Sometimes it fails in both, but as a rule it has a favorable action in these two disorders. It is an ideal sedative for irritating cough and is frequently an ingredient of cough mixtures. When such are to be used in phthisis or other incurable diseases, codeine is both safe and effectual. But for transient disorders it should be employed sparingly and for but brief periods, as it is a habit-forming drug. Codeine is indicated in many irritable and painful conditions in which morphine or opium are seemingly indicated, but in which they are not well tolerated. It is, in many respects, much kindlier in action than those preparations—seldom causing heavy sleep, perspiration, skin eruptions, obstinate constipation, retching and vomiting, or other gastro-intestinal disturbances, when given in the smaller doses. From 1/2 to 1 grain will relieve pain and spasmodic action without acting as a soporific. It is preferable to morphine after abdominal operations to relieve pain and give rest. As a temporary anodyne it may be given in neuralgia, gastralgia, ovarian pain, and rheumatic pain; for prolonged use it is justifiable in lingering and incurable diseases, as cancer and tuberculosis, to relieve pain and give rest and sleep. For this purpose, provided it is effectual, it is to be preferred to opium or to morphine. In beginning codeine medication the smaller doses (1/3 gr.) should always be given.

COLCHICUM.

The dried (I) root and (II) seed of *Colchicum autumnale*, Linné. (Nat. Ord. Liliaceæ.) England and other parts of Europe. *Dose*, Corm, 1 to 5 grains; seed, 1 to 5 grains.

Common Names.—I. Colchicum Corm (Colchici Cormus); II. Colchicum Seed (Colchici Semen).

Principal Constituent.—The powerful alkaloid *Colchicine* (see below.)

Derivative.—*Colchicina*, Colchicine. A very toxic alkaloid occurring as pale yellow scales or powder, practically odorless. It should not be tasted. Soluble in water. The salicylate is sometimes employed. *Dose*, 1/300 to 1/100 grain.

Preparation.—*Specific Medicine Colchicum*. *Dose*, 1 to 10 drops.

Specific Indications.—Acute gout; rheumatism, without much fever, occurring in gouty individuals; tearing pain, aggravated by heat.

Action and Toxicology.—Upon the skin and mucosa colchicum is irritant, causing smarting and redness, sneezing and conjunctival hyperæmia. Small doses increase the secretions of the skin, kidneys, liver, and bowels. Large doses are dangerous, producing gastric discomfort, nausea

and vomiting and purging, and violent peristalsis with much intestinal gurgling. Poisonous doses produce a violent gastro-enteric irritation, with symptoms much like those of cholera—agonizing griping, painful muscular cramps in the legs and feet, large but not bloody evacuations of heavy mucus and serum, thready pulse, collapse, and death. Toxic doses are almost sure to kill in spite of efforts to save life, the patient dying a slow, painful, and agonizing death, the final act of which is respiratory paralysis. Consciousness remains to the end.

The reputed antidote is tannin freely administered with plenty of water and followed by the use of emetics or the stomach pump. Opium may be given to relieve pain, atropine to sustain breathing, and artificial heat to maintain bodily warmth.

Therapy.—Colchicum is an extremely dangerous medicine and should be used with the greatest of caution. It is the remedy for acute gout, temporarily giving quick relief if administered short of purgation. For some unknown reason attacks recur more frequently when colchicum has been used, though it almost magically relieves the paroxysms. It is useful for disorders depending upon a gouty diathesis, though it is less effectual in chronic gout than in the acute form. In rheumatism, pure and simple, it usually has little or no value, though we have had excellent results after failure with the usual antirheumatics, in cases where pain persisted in one part for longer periods than usual, in acute articular rheumatism with but little fever. These cases resembled gonorrhœal arthritis and were accompanied by a leucorrhœal discharge, but were not gonococcic. In most cases the fingers, wrists, and abdomen were the most painful locations. Some have advised it in so-called chronic rheumatism when the patient is known to have occasional gouty attacks. We have seen it do good in rheumatoid arthritis; a condition much more prevalent in this country than genuine gout, a disease rarely encountered in America. In rheumatoid headache and in rheumatic iritis colchicum is sometimes of value when occurring in one with swollen joints, with or without effusion, and attended by tearing, muscular pain, aggravated by heat. Subacute and chronic sciatica are asserted to have been relieved by colchicum when the pain is sharp, shooting, tearing, or dull, from back to hips and down the legs, fever being absent.

In rheumatic conditions colchicine salicylate in doses of the 1/128 grain is often more serviceable than colchicum.

COLLINSONIA.

The fresh root and plant of *Collinsonia canadensis*, Linné. (Nat. Ord. Labiatæ.) Damp and rich soils of woods from Canada to Florida.

Common Names: Stone-root, Rich-weed, Horse-balm, etc.

Principal Constituents.—Resins and volatile oil.

Preparations.—1. *Specific Medicine Collinsonia. Dose*, 1/10 to 30 drops.
2. *Aromatic Collinsonia* (prepared from the plant). *Dose*, 1 to 30 drops.

Specific Indications.—Irritation, with a sense of constriction in the larynx, pharynx or anus; sense of constriction with tickling in the throat, with cough arising from use of the voice; a sensation as if a foreign body were lodged in the rectum, with a painful contraction of the sphincter and perineum; sense of contraction in the rectum, with constipation due to vascular

engorgement of the pelvic viscera; scybalous feces; sticking pains in the heart, larynx or bladder; contracted abdomen; vesical tenesmus; hemorrhoids; varicocele; follicular tonsillitis, with chronic hypertrophy of the faucial glands; any condition with *weight and constriction*, with or without heat.

Action.—Collinsonia affects chiefly the venous system and the mucous membranes, particularly the hemorrhoidal venous circulation. It also stimulates the vagi, relieving irritation of the parts to which they are distributed, and is believed to strengthen the action of the heart. Small doses of the green root produce emesis, and sensible doses of the fluid preparations cause an increase in urine and slightly that of the skin.

Therapy—Collinsonia is a remedy for *venous stasis* and for irritation of the mucosa. Chiefly it meets one prime condition and the many disorders dependent thereon. This is atony of the venous circulation, whether due to relaxation of the blood vessels or to lack of tone in the venous side of the heart. Therefore its best results are obtained in conditions showing feeble or sluggish venous and capillary flow. Under these conditions it specifically improves impairment of the mucous membranes, appearing to be most active in disorders of the throat and rectum, though venous stasis in any organ or part is corrected by it.

Collinsonia is the most effective medicine we have for that form of laryngitis known as "minister's sore throat"—a hyperæmic or congestive state, with tenderness, hoarseness, and cough brought on by intensive speaking or singing. It is common among public speakers, singers, auctioneers, hucksters, and others compelled to use the voice beyond the ordinary. It is also valuable in other forms of laryngitis, with congestion or hyperæmia of the vocal apparatus, in chronic bronchitis, pharyngitis, tracheitis, and aphonia, all depending upon irritation associated with venous debility. ℞. Specific Medicine Collinsonia, fl℥ij to fl℥j; Simple Syrup, q. s. fl℥iv. Mix. Sig.: One teaspoonful every 3 or 4 hours.

Foltz advised it in the early stage of middle ear disorders, with free non-purulent secretions, and when complicated by follicular pharyngitis and hypertrophied Luschka's glands.

For many of the throat disorders Aromatic Collinsonia is preferred by some prescribers.

The second great use for collinsonia is in rectal venous debility. Here the smaller doses are more effectual. In hemorrhoids it usually does not cure, though it may do so early in their course. It is to be used when there is vascular engorgement of the pelvic viscera, with a sense as if a foreign body were lodged in the rectum, causing constant uneasiness and affecting the nervous system profoundly. There is weight, heat, and dull pain, with or without scybalous constipation, or sometimes with partly semifluid and partly scybalous feces. The only rational procedure is to have the disturbing hemorrhoids surgically removed, but if this cannot be done, or the patient will not consent, then recourse to collinsonia will give us much relief as can be obtained from any safe medicine. Collinsonia relieves, to a lesser extent, subacute proctitis, the tenesmus of mild types of dysentery and diarrhœa and rectal pain following operations, as well as that of fissures, fistulæ, and allied conditions, though much reliance cannot be placed upon

it for any of these conditions, except in the hemorrhoids of the type described. It does, however, relieve discomfort in the rectum without apparent lesion other than that of vascular engorgement.

Many value collinsonia in gastro-intestinal irritation with torpor of the portal circulation, irritation of the mucous membranes, and loss of appetite. Indigestion, spasmodic pain, gastric catarrh, and irritative dyspepsia, all with more or less constipation, appear to be benefited by collinsonia. By increasing innervation and relieving irritability it proves useful in atonic dyspepsia, with poor abdominal circulation.

Irritation of parts supplied by the vagi is relieved by small doses of collinsonia. Thus it ameliorates some cases of asthma, chronic cough, and the cough attendant upon disorders of the heart. Some value it in mitral regurgitation and in rheumatism of the heart. In all conditions the dilated capillaries showing passive engorgement will guide to its use. It was formerly regarded a remedy for gravel, but is little valued for that purpose now further than to relieve irritation and discomfort when gravel gives rise to pelvic vascular debility. Cases of varix of the vulva have been reported as modified, but not cured by it; the same is true of varicocele and varicose veins of the legs.

In whatever disorder collinsonia is helpful, there is always a *sense of weight and constriction*, venous engorgement, dilated capillaries, and muscular atony.

COLLODIUM.

A solution of Pyroxylin or Soluble Gun Cotton (40), in ether (750), and alcohol (250).

Common Name: Collodion.

Description.—A thickish, colorless liquid of neutral reaction and ether-like taste and odor. It should be kept in securely-corked vials.

Preparations.—1. *Collodium Flexile*, Flexible Collodion. (Contains Collodion, Camphor, and Castor oil). Resembles collodion in appearance and odor. When evaporated it forms a film which is barely contractible and is elastic.

2. *Collodium Cantharidatum*, Cantharidal Collodion, (Blistering Collodion, Vesicating Collodion). Flexible Collodion containing Cantharides. An epispastic.

Action and Therapy.—Collodion upon evaporation forms a so-called artificial epidermis. It may be used where local pressure is desired to limit the supply of blood and thereby control inflammation and pain, as in incipient boils, in orchitis and epidymitis, mastitis, chilblains, and small sprains; also as a protective to abraded or cut surfaces when about to handle decayed substances, as in dissecting. It is also often used, with questionable wisdom, upon wounds, particularly of the scalp, and on bites, stings, abrasions, and ulcers, presumably for protection. It prevents drainage, however, and possibly confines infecting material, thus favoring further absorption. Its best use is to protect the tissues before damage, when about to handle noxious substances.

Flexible Collodion may be used where compression is not desired, but for the protective uses to which collodion is adapted. It does not crack and is pliable.

Cantharidal Collodion is used when a small blister is desired. It is scarcely ever needed.

A Styptic Collodion containing alcohol and tannic acid was at one time official. It was applied to small wounds, especially of the scalp, to control bleeding.

COLOCYNTHIS.

The dried, peeled pulp of the fruit of *Citrullus Colocynthis* (Linné), Schrader. (Nat. Ord. Cucurbitaceæ.) Mediterranean basin of Europe, Asia, and Africa. *Dose*, 1 to 5 grains.
Common Names: Colocynth, Bitter Apple, Bitter Cucumber, Colocynth Pulp.
Principal Constituent.—The bitter active glucoside *colocynthin* ($C_{56}H_{34}O_{23}$).
Preparation.—*Specific Medicine Colocynth. Dose*, 1/30 to 5 drops.

Specific Indications.—Pain of a cutting, twisting, boring, or tearing character, and if of the bowels, a desire to go to stool; visceral neuralgia, with cutting pain; dysentery, with tormina and small passages of mucus, or diarrhœa with mucoid passages and intense cutting pain; colicky pains anywhere in the abdomen (minute doses); distressing accumulations of gas; constipation with dry scybala and griping pain in the lower bowel (larger doses).

Action.—Colocynth is a decided local irritant. In small doses it is a stomachic bitter, exciting an increased flow of gastric juice. In even moderate doses it is a violent hydragogue cathartic, producing copious watery evacuations, and sometimes violent emesis, tormina, and bloody stools. It may cause death from gastro-enteritis. The powder or the tincture applied to a raw surface or to the abdomen will purge as if given by the mouth. Colocynth, in small doses, increases the renal function.

Therapy.—Colocynth is a powerful hydragogue cathartic, but is seldom employed as such in Eclectic practice. Except in minute doses it should not be given alone, at least never to the extent of causing purging. It is commonly administered with other cathartics in pill form, the compound extract of colocynth being preferred, and its violence controlled by hyoscyamus or belladonna. When so employed it is usually in melancholia and hypochondriasis with sluggish hepatic and intestinal action, with large fecal accumulations; and sometimes to produce local pelvic effects and thereby stimulate menstruation in atonic amenorrhœa. It has been largely employed in ascites from all causes, but while actively cathartic, it is less desirable than some other hydragogue cathartics. It should never be so used in the aged and where there is great debility or gastro-intestinal inflammation. It is very rarely employed in Eclectic therapy for dropsical effusions.

Specifically, colocynth is a remedy for visceral pain of a sharp, colicky character—cutting, darting, cramping, or tearing pain. The fractional dose only should be used. In sharp "belly ache" attending stomach and bowel disorders, colocynth is splendidly effective when the patient feels cold, weak and faint, and the pain is so great as to cause him to flex his body upon his thighs. Even when neuralgic or rheumatoid, such a condition is promptly relieved by colocynth.

In atonic dyspepsia, with bitter taste, bitter yellow eructations, bloating after eating, with sharp, griping or cutting pain in the umbilical region minute doses give excellent results. When gaseous accumulations cause disturbances of breathing, or cardiac palpitation, with loud belching and expulsion of flatus, and nausea and vomiting are present, colocynth should be given with prospects of prompt relief. ℞. Specific Medicine Colocynth (1 x dilution), gtt. j to x; Water, fl℥iv. Mix. Sig.: One teaspoonful every 3 or 4 hours. Where there is a lack of normal secretion 5 drops of tincture of capsicum may be added to the mixture.

With similar symptoms minute doses act well in cholera infantum; in chronic diarrhœa with slimy stools and tympanites; in diarrhœa from overeating or improper food; and in dysentery with great tormina, tenesmus and cutting pain, with ineffectual efforts at stool it is one of the most certain of agents to relieve. In intestinal and hepatic torpor, with bloating and dry scybalous stools it should be given in somewhat larger doses (1/4 to 1 drop of Specific Medicine Colocynth). When persistent headache depends upon the stomach and bowel perversions named above it is often corrected by colocynth. In that form of lumbago and sometimes pressure sciatica, due to gaseous accumulations in the bowels, colocynth, capsicum, and bryonia should be considered. The dose should not be large enough to purge.

Colocynth is useful in neuralgia of the viscera in the parts supplied by the splanchnic nerves, as neuralgic colic. Other nerve endings seem to respond to it, for it relieves ovarian neuralgia, orchialgia, and sometimes neuralgia of the fifth nerve, when the characteristic cutting pain prevails. It should be given also when colicky pain precedes or accompanies amenorrhœa.

CONDURANGO.

The bark of *Gonolobus Cundurango*, Triana (*Marsdenia Condurango*, Reichenbach) (Nat. Ord. Asclepiadaceæ). South America, especially Ecuador.

Common Names: Cundurango, Eagle Vine, Mata-peroo.

Principal Constituent.—A supposed glucoside *condurangin*, giving also alkaloidal reactions.

Preparation.—*Fluidextractum Condurango*, Fluidextract of Condurango. *Dose*, 5 to 30 drops.

Action and Therapy.—A drug of considerable power, introduced into medicine in 1871 as a cure for syphilis and cancer of the stomach, in both of which it has but an unsustained reputation. It is thought, however, by competent clinicians, to have some retarding effect upon the latter, by its favorable action upon the mucosa. Most probably it is little more than a pain reliever in mild gastralgia and a tonic in gastric debility. It is usually administered in the form of a wine (fl℥ss. to fl℥j), or the fluidextract (5 to 30 gtt.); sometimes a decoction (bark, ℥ss. to Water, Oj, boiled down to Oss) is given in tablespoonful doses 3 times a day. A little hydrochloric acid is suggested by Hare to be given with it in gastric carcinoma on account of the absence of that acid in the gastric juice under such conditions.

Condurangin acts powerfully upon the nervous system, inducing in animals, impaired appetite, vomiting, ptyalism, muscular weakness, convulsions, and paralysis.

CONIUM

The full grown fruit, gathered green, of *Conium maculatum*, Linné (Nat. Ord. Umbelliferæ). Europe and Asia; naturalized in the United States.

Common Names: Hemlock, Poison Hemlock, Spotted Hemlock.

Principal Constituents.—Five alkaloids of which the intensely poisonous liquid *coniine* ($C_8H_{17}N$) is most important; the others are: *conhydrine* ($C_8H_{17}NO$), *pseudo-conhydrine* ($C_8H_{17}NO$), *methyl-coniine* ($C_9H_{19}N$), and *ethyl-piperidine* ($C_7H_{15}N$).

Preparation.—*Specific Medicine Conium.* 1/30 to 3 drops.

Specific Indications.—Nervous excitation and excessive motility, with or without pain; neuralgic pain; pain in the aged, and when there are cacoplastic deposits; gastric pain; nervousness and restlessness; mild maniacal

excitement; persistent spasmodic or hacking cough; enfeebled state of the sexual organs, with late and scanty menstruation.

Action and Toxicology.—Conium does not affect the intellectual portion of the brain; and it acts but feebly on the spinal cord. It does, however, powerfully depress the peripheral motor endings, and in excessive amounts, the sensory terminals. Only very large doses affect the circulation and the respiration, when blood pressure falls and respiration becomes paralyzed. The latter is the cause of death by conium and is due to the combined results of depression of the respiratory center in the medulla and the nervo-muscular paralysis of the muscles of respiration. Involuntary muscles are not affected by conium, nor is the heart-muscle or nerves appreciably affected.

Full doses of conium produce dryness of the throat and thirst, nausea, dizziness, sinking at the stomach, numbness, muscular relaxation, and depression of the circulation. Toxic amounts cause staggering gait, muscular heaviness and prostration, with failure of locomotion, ascending paralysis, difficult and labored articulation, dyspnœa, dilated pupils, palpebral ptosis, and convulsions terminating in death. In rare instances coma ensues, but usually consciousness and the intellect remained unimpaired until death. The most marked symptoms of poisoning are the staggering gait, drooping eyelids, and ascending muscular prostration.

In poisoning by conium the emetic may be used, but it is preferable to repeatedly wash out the stomach by means of the stomach pump. Artificial respiration and heat are to be used, and strychnine, atropine and digitalis, as well as the diffusible stimulants, to sustain respiration and the circulation.

Therapy.—*External.* Locally applied extract of conium, or the powdered drug, relieves the pain of cancerous growths and ulcers. Locke advised, ℞. English Extract of Conium, ʒij; Petrolatum, ʒvj. Mix. Apply locally.

Internal. Conium is a remedy for excessive motility and for pain. It also favors sleep, not because it is a hypnotic like opium, but because it relieves pain when that is the cause of the sleeplessness, or when due to an excitable action of the heart. It is also a remedy for the restlessness, with or without pain, associated with reproductive weakness, or due to sexual excesses. With this is a state of apathy, frequently frigidity in the female, and imperfect menstruation and leucorrhœal discharges. The mentality is disturbed, often to the verge of mania. In such mild forms of nervous unrest and excitability small doses of conium will render good service.

Chorea is one of the incoördinate disorders that is sometimes relieved by conium, but not all cases respond to it. It has been advised in tetanus, but is insufficient except in doses which would be equally as dangerous as the disorder itself. It is better adapted to control the excessive movements of hysteria and mania, but in the former having little effect upon the psychic phase of the disorder. It has been used in teething, when twitching of the muscles is present, in laryngismus stridulus, also in whooping-cough, but we have safer and more satisfactory remedies for these affections. Some cases of epilepsy due to masturbation have been relieved by conium, and it lessens the movements of paralysis agitans.

As a remedy for pain conium is fairly efficient, but it takes fair-sized doses to accomplish results. As the terminals of the sensory and motor nerves are directly affected by the drug, it is best adapted to peripheral pain with excessive mobility. Thus it relieves spasmodic neuralgia, neuralgia from carious teeth, ovarian neuralgia, and gastralgia. In gastric ulcer it is quite efficient and safe, while for relief of pain and to give rest it is a most important drug in gastric carcinoma. If there is much destruction of tissues it is less effective, but tends to keep the surrounding part obtunded and muscularly quiet, notwithstanding the statement that it has no control over involuntary musculature. In the intestines, however, it does not seem to lessen peristalsis, and is therefore not constipating, like opium and morphine. Conium has been used for so-called chronic rheumatism, especially in the aged, who complain of muscular soreness and joint pains, with loss of sleep. Given within bounds it may relieve and can do no harm. Sometimes it relieves pruritus, especially the senile form so distressing to old people and preventing rest and sleep.

Conium sometimes reduces glandular swellings. It frequently causes the disappearance of nodular masses in the axillary and mammary glands. By some it has been assumed that these are carcinomatous. There is no evidence of it having been of any service in dissipating ulcerating growths of the breast; therefore it is safe to assume that such nodules as are influenced by conium are probably not cancerous, but more than likely of a strumous character. At any rate we are not justified in delaying necessary measures by a long course of conium medication with uncertain prospects of relief in undoubted scirrhus of the breast. It may, however, be applied and be given to relieve pain even when a cure is not possible. It relieves the pain of swollen mammæ during the menstrual periods and mitigates the distress of spasmodic dysmenorrhœa.

In acute mania conium sometimes acts with great promptness. While occasionally subduing violent cases it is best adapted to those with mild excitability, great restlessness, with more or less wandering of the mind—much like the low delirium attending prostrating fevers. In fact, it is often useful, but must be carefully exhibited, in true typhomania, with subsultus tendinum. The field for conium in nervous disorders is still open to exploration, with the prospect of finding it adapted to a wide variety of nervous affections with excitation and muscular impressibility.

CONVALLARIA.

The rhizome and rootlets of *Convallaria majalis*, Linné. (Nat. Ord. Liliaceæ.)

Common Name: Lily of the Valley.

Principal Constituents.—Two glucosides: *convallamarin* ($C_{32}H_{44}O_{12}$), a bitter, crystalline powder, and *convallarin* ($C_{34}H_{62}O_{11}$), the acrid principle.

Preparation.—*Specific Medicine Convallaria. Dose*, 1 to 10 drops.

Specific Indications.—Cardiac irregularities due to mechanical impediments; mitral insufficiency; feeble circulation and low arterial tension; dropsy of cardiac origin; palpitation and vehement heart action, with arrythmic movements, dyspnœa, and diminished arterial pressure; feeble, quickened pulse, with capillary obstruction.

Action and Therapy.—In its effects upon the human circulation convallaria closely resembles that of its more powerful congener, digitalis, without, however, causing the unpleasant disturbances occasioned by that drug. Unlike digitalis it is not cumulative, nor is it distinctly poisonous. Moreover, it has a laxative action, and like digitalis, increases diuresis secondarily, by its effects upon blood pressure.

Like digitalis, convallaria may be used where there is feeble circulation and low blood-pressure. While digitalis is the more often indicated, sometimes convallaria is more effective on account of the disturbing extravascular effects of the former. Convallaria appears to act best in those cases of circulatory failure in which there is imperfect circulation within the heart itself and probably due to capillary resistance or peripheral circulatory enfeeblement. By relieving the latter the cardiac embarrassment is removed. Convallaria slows the pulse and gives increased force to the heart-beat. It undoubtedly tones the heart muscle and strengthens its action. By the double action of augmenting the power of the heart and the tone of the vessels, as well as by its secondary effect of increasing renal activity, it acts extremely well in dropsy of cardiac origin. Palpitation and irregular heart movements, dyspnœa, diminished urinary secretion, albumen, hepatic fullness and engorgement, and œdema—symptoms of this form of cardiac insufficiency, gradually disappear under small and continued doses of this drug. Moderate doses calm cardiac excitement, such as is due to overexertion and the excessive use of tobacco. Cardiac arrythmia and hurried action of the heart are especially benefited by it.

The heart irregularities corrected by convallaria are not those due to organic degeneration, but rather those of an obstructive character, due to mechanical causes, as when the mitral valves are involved. Thus it is especially valuable in mitral insufficiency, with its attendant dyspnœa and palpitation. When acting favorably the heart action becomes slower and stronger, normal rhythm is established, arterial pressure increased, respiration deepened, and the sense of suffocation, with the distressing and painful desire for air, is dispelled. A drug that will bring about these results and do it kindly is an ideal heart stimulant, and such is convallaria. Convallaria relieves the sense of præcordial oppression and faintness that so frequently follows prostrating diseases. Not alone is it a heart tonic, but a gastric tonic as well. Therefore it is indicated by the cardiac debility that follows typhoid fever, la grippe, acute articular rheumatism, and other heart-enfeebling diseases. When a heart stimulant is needed during acute rheumatism, convallaria is, as a rule, preferable to digitalis, and it is often valuable in the early stages of rheumatic carditis and endocarditis, using it in fractional doses. Convallaria is of less service in stenosis of the aorta than in mitral disorders.

CORALLORHIZA.

The rhizome of *Corallorhiza odontorhiza*, Nuttall. (Nat. Ord. Orchidaceæ.) Rich woods in eastern half of the United States. *Dose*, 1 drachm.

Common Names: Coral Root, Chicken Toe, Crawley, Dragon's Claw.

Principal Constituents.—Has not been analyzed, but probably contains potassium nitrate.

Preparations.—1. *Tinctura Corallorhizæ*, Tincture of Coral Root. (Coral root, ℥iv; Dilute Alcohol [or Whisky] Oj.) *Dose*, 1 to 2 fluidrachms.

2. *Infusum Corallorhizæ*, Infusion of Coral Root. (Crushed rhizome, ℥ss; Boiling Water, Oj). *Dose*, 1 to 2 fluidounces.

Specific Indications.—General prostration, malaise, hacking cough, loss of appetite, reduced weight, pleuritic pain, bronchial irritation and low pyrexia.

Action and Therapy.—This is the most perfect diaphoretic we know of, duplicating the natural process of perspiration when given in small doses, and increasing the watery contents when administered in hot infusion. It even excels asclepias, is pleasant to the taste, acts kindly upon the stomach, and lacks the heart depressing qualities of jaborandi. It was once largely used in fevers. Its principal use is in subacute inflammatory disorders of the respiratory tract, being especially valuable in the declining stages of bronchopneumonia, of a low but inactive type, with much depression, prostration after cough or effort, copious, heavy expectoration, and general debility. For convalescence from such states and after bronchitis, la grippe, and pneumonia it is an ideal remedy. In those of a phthisical build—the hippocratic type, much hacking cough, loss of weight, lack of appetite, poor digestion, pleuritic pains, and general prostration—yet not actually consumptive, it is one of the best tonics we have ever employed. The appetite is the first to respond, cough and pain cease, there is better action of the kidneys and skin, and general recuperation gradually takes place. For dry bronchial irritation, with wheezing, tightness of the chest, paroxysms of irritable cough, together with a dry or inactive skin, coral root is extremely effective. In respiratory debility corallorhiza acts slowly but surely. A hot infusion promotes menstruation and suppressed lochia and relieves after-pains, but as many other agents operate equally as well this agent is too expensive to use for these purposes. It is to be regretted that its extreme scarcity makes corallorhiza an almost unobtainable drug.

COPAIBA.

An oleoresin derived from species of *Copaiba* growing in South America. *Dose*, 5 to 30 drops.

Description.—A viscid, pale-yellow or brownish-yellow liquid, without or with a faint fluorescence (green), and having a bitter, acrid, and persistent taste, and a distinctive aroma. Soluble in chloroform, ether, dehydrated alcohol, and volatile or fixed oils; partly soluble in alcohol; insoluble in water.

Specific Indications.—Vesical pressure and tenesmus, frequent urging to urinate, the urine passing in drops; itching, burning or smarting in the urethra after urinating; urethral mucoid discharges; laryngeal irritation; cough, with thick tenacious sputum, accompanied by loud rales.

Action.—Copaiba is a stimulating antiseptic when applied to the skin and mucosa. Small doses taken internally act as a stimulant and antiseptic diuretic. It restrains excessive mucous discharges. When swallowed it causes gastric warmth, unpleasant eructations, and sometimes nausea and vomiting. Continued use impairs the digestive processes. It is readily absorbed, imparting its odor and bitterness to the secretions. While apparently eliminated by all the emunctories, it is chiefly passed in the urine in company with glycouronic acid. Large doses occasion gastroenteritis and hæmaturia. A transient measles-like eruption on the skin, with unpleasant formication and itching, or an erythematous, urticarial or bullous outbreak may occur from its use. It is not determined whether this is due to elimination-irritation, or to gastric disturbances produced by the drug.

Therapy.—*External.* Copaiba is sometimes applied to frost-bites and chilblains, sore nipples, old ulcers, and anal fissures, and to fistulous tracts to soften hardened edges and surfaces; also in sluggish chronic skin affections when a stimulating antiseptic action is desired.

Internal. Copaiba is a remedy for excessive mucous discharges after the subsidence of acute inflammation. For this purpose it is rarely used in chronic bronchitis, especially when coincident with a catarrhal condition of the bladder. It is of much value in intractable gonorrhœa in the male to reawaken a dormant infection and recreate the active symptoms, after which the smaller doses are used to restrain the discharge and antisepticize the membranes. It should never be used in the acute inflammatory stage of gonorrhœa, with pronounced urethral irritation and profuse secretion. This stage should be treated with ℞. Specific Medicine Aconite, gtt. x; Specific Medicines Gelsemium and Cannabis, aa fl℥j; Simple Syrup, q. s. fl℥ iv. Mix. Sig.: One teaspoonful every 3 hours. Having used the required local application, and rendered the urine bland by the use of small doses of sodium bicarbonate well diluted, employ the following after the acute phase has subsided: ℞ Copaiba, fl℥j; Alcohol, fl℥j. Mix. Dose, 5 to 10 drops in sugar and water 4 times a day. If chronic or unduly prolonged use the following: ℞. Copaiba; Spirit of Nitrous Ether, aa fl℥ss; Liquor Potassæ; Essence of Cinnamon, aa fl℥j; Mucilage of Acacia; Simple Syrup, aa fl℥j. Mix. Sig.: One teaspoonful after each meal. Copaiba only helps gonorrhœa when brought in direct contact with the parts affected, as it does when passed in the urine. For this reason it is more effectual in the male than the female in whom at least a part of the infection is vaginal. It is also less valuable by injection than when used internally. The foregoing treatment is Locke's method, and is adapted to otherwise unconquerable cases. Most cases of gonorrhœa are now readily cured by more modern means.

COPTIS.

The rhizome and rootlets of *Coptis trifolia*, Salisbury. (Nat. Ord. Berberidaceæ.) A plant of dark, cold swamps and sphagnous woods, found in Siberia, Greenland, and Iceland, and in the United States, following the Appalachians as far south as Alabama.

Common Names: Gold Thread, Mouth Root, Canker Root.

Principal Constituents.—Two alkaloids: *berberine* (yellow) and *coptine* (white). It is devoid of starch, tannin or resin.

Preparations.—1. *Decoctum Coptis*, Decoction of Coptis. (Coptis, ℥ii, to Water, ℥viij.) *Dose*, 2 to 6 fluidrachms. Used freely as a local wash.

2. *Tinctura Coptis*, Tincture of Coptis. (Coptis, ℥j; Diluted Alcohol, Oj.) *Dose*, 30 to 60 drops.

Specific Indications.—Aphthous ulceration; atonic dyspepsia; thrush.

Action and Therapy.—*External.* The most effective application for thrush in infants. The decoction should be freely applied and at the same time given internally. The infusion or the tincture may be used, with or without hydrastis, in aphthous ulcers of the mouth.

Internal. Coptis is a pure bitter and one that ought to be more generally used. It ranks with quassia, calumba, gentian, and similar agents in efficiency and may be used for many of the purposes for which hydrastis is employed. Its use in the stomachic disorders associated with, preceding or following thrush is the most certain in therapy, and its internal employment hastens the local cure, which it quickly accomplishes. Coptis is a good

stimulant for atonic indigestion and dyspepsia, with deficiency in the normal flow of the peptic juices.

CORIANDRUM.

The dried, ripe fruit of *Coriandrum sativum*, Linné. (Nat. Ord. Umbelliferæ.) Italy, and cultivated in other parts of the world. *Dose*, 20 to 60 grains.

Common Names: Coriander, Coriander Fruit, Coriander Seed.

Principal Constituent.—An aromatic oil (*Oleum Coriandri*).

Preparation.—*Specific Medicine Coriander. Dose*, 10 to 60 drops.

Action and Therapy.—Stimulant and carminative; but mostly used as an adjuvant or corrigent to other medicines.

CORNUS.

The bark and root-bark of *Cornus florida*, Linné. (Nat. Ord. Cornaceæ.) A beautiful flowering tree of the United States. *Dose*, 5 to 60 grains.

Common Names: Dogwood, Flowering Dogwood, Flowering Cornel.

Principal Constituents.—A bitter principle, *cornine*, and 3 per cent of tannin.

Preparation.—*Specific Medicine Cornus. Dose*, 1 to 60 drops.

Action and Therapy.—Cornus is tonic and feebly antiperiodic. In times of scarcity it has been used in lieu of cinchona, or when cinchona or quinine is not tolerated. Its tonic properties may be utilized after fevers, particularly of the periodic type; and it is said to be useful in headache from quinine, pyrosis, and general exhaustion. It is adapted to cases with feeble, relaxed tissues, with weak pulse and sub-normal temperature. It has been suggested as useful in gastric ulcer. The preferred doses are from 5 to 20 drops.

CORYDALIS.

The tubers of *Dicentra canadensis*, DeCandolle. (Nat. Ord. Fumariaceæ.) Eastern half of the United States, in rich soils of woods. *Dose*, 10 to 60 grains.

Common Names: Turkey Corn, Squirrel Corn, Wild Turkey Pea.

Principal Constituents.—The alkaloid *corydaline* (not the resinoid *corydalin*), resin, and fumaric acid.

Preparation.—*Specific Medicine Corydalis. Dose*, 10 to 60 drops.

Action and Therapy.—Once a very popular Eclectic medicine, corydalis seems to have fallen into unmerited neglect. It is decidedly alterative and tonic. While not distinctly antisyphilitic, it may be used among other alteratives for the syphilitic dyscrasia and for scrofulosis, and the attendant evils that accompany such debility. In atonic leucorrhœa in strumous subjects it may be exhibited with good effect, and it may be given as a tonic in digestive atony with dysentery or diarrhœa in pot-bellied children with foul breath and poor digestion. It should be revived as a remedy to promote waste and repair.

CRATÆGUS.

The ripe fruit and bark of (1) *Cratægus Oxyacantha*, Linné, and (2) other species of Cratægus. (Nat. Ord. Rosaceæ.) 1. England and other parts of Europe and in Central and Northern Asia; 2. America.

Common Names: (1) English Hawthorn, May; (2) Haw, Red Haw, Hawthorn, Thorn.

Principal Constituents.—The fresh bark contains a water soluble, crystallizable, bitter body, little soluble in alcohol. The flowers of the English hawthorn contain trimethylamine ($N[CH_3]_3$), a circulatory depressant.

Preparation.—*Specific Medicine Cratægus. Dose*, 5 to 60 drops.

Specific Indications.—Tentatively the indications for cratægus may be stated thus: Cardiac weakness, with valvular murmurs, sighing respiration, or other difficult breathing, especially when associated with nerve depression or neurasthenia; mitral regurgitation, with valvular insufficiency; cardiac pain; præcordial oppression; dyspnœa; rapid and feeble heart action; marked anemia, associated with heart irregularity; cardiac hypertrophy; and heartstrain, due to over-exertion or accompanying nervous explosions.

Action and Therapy.—The bark, fruit and leaves of several species of the genus Cratægus have in the past been used as astringents and tonics. Though a well-known wild shrub of thickets and commonly cultivated hedge and ornamental plant, the English hawthorn seems to have largely escaped the exact investigators of medicinal plants until a quite recent date. In fact, cratægus is one of the most recently introduced medicinal agents of plant origin. Furthermore, it is distinctive in occupying almost wholly a position in cardiac therapy, though recognized to some extent as a general tonic. Investigators are divided as to its activity, some claiming it only as a functional remedy, while others go so far as to claim it curative of many heart irregularities, even in the presence of an actual organic disease of that organ. Among the conditions in which cratægus is accredited with good work are angina pectoris, endocarditis, myocarditis, and pericarditis, valvular incompetency with or without enlargement of the rings, rheumatism of the heart, dropsy depending on heart disorders, neuralgia of the heart, tachycardia, and in atheromatous conditions of the vessels. The exact indications are as yet none too well determined, enthusiastic admirers of the drug having unwittingly overestimated its power. There is no doubt, however, of its value in many of the conditions mentioned, especially the functional types; and there can be no question as to its value as a tonic to the heart-muscle. It is not poisonous, has no cumulative effect, and apparently from reports of a large number now using it, may be useful to control many of the symptomatic results depending upon a badly functionating or tired heart. Cratægus has been suggested to rest that organ and thereby guard against arteriosclerosis. It is a new remedy still on trial; and as yet with no rational explanation of its reputed powers. The smaller doses are suggested as more likely to succeed than full doses.

CREOSOTUM.

Creosote, Creasote.

A liquid obtained in the distillation of wood tar, and composed chiefly of a mixture of phenols and their derivatives, principally guaiacol and creosol. It should be carefully kept in dark-amber, tightly-stoppered bottles. *Dose*, 1 to 8 minims. Creosote derived from Beech wood-tar is preferred by many clinicians.

Description.—A highly refractive, oily, nearly colorless or yellowish liquid, having a sharp caustic and burning taste, and a peculiarly penetrating and smoke-like odor. Creosote mixes with alcohol, ether, and oil; and is but very slightly soluble in water.

Action and Therapy.—Creosote is antiseptic and antipruritic. It relieves itching more perfectly than does carbolic acid. Its persistent and disagreeably penetrating odor, however, has militated against it, so that it is seldom used where the former may be applied. Creosote upon cotton may be packed into the cavity of a carious tooth, provided the nerve is exposed,

to relieve toothache, almost immediately stopping pain. A solution (1 to 200) daily sprayed upon the tonsils will often prevent the recurrent winter attacks of tonsillitis in children predisposed to such invasions. In the form of *Aqua Creosoti* (1 part of creosote to 100 of freshly boiled distilled water) it may be used as a lotion, or injection for many of the purposes for which phenol is similarly employed (see *Phenol*). The vapor of creosote, generated from hot water or from mixtures of alcohol (1 to 3), chloroform, or other solvents, or from distribution on cotton placed in a properly devised inhaler, is largely employed in subacute laryngitis, subacute bronchitis, and in pulmonary tuberculosis chiefly to check excessive purulent expectoration. It is very effective when used in this manner, and is also of service to control or mask the fetor of ozæna. This, in fact, is the best use for creosote. It should not be used in acute inflammations, nor when there is a tendency to pulmonary hemorrhage.

Internal. The physiological effects of creosote are very similar to those of phenol and treatment of excessive doses is the same as for that drug. (See *Phenol.*) Small doses of creosote sometimes relieve nausea. In fermentative dyspepsia caused by excessive indulgence in sugars and sweets, and in yeasty fermentation, with pyrosis and pain, it is of signal value. It checks fermentation through its antiseptic action and obtunds the gastric nerve-terminals by its anæsthetic power.

Since 1873, when Reichenbach proposed creosote for the cure of pulmonary consumption, it has been sporadically revived from time to time for various purposes in the treatment of that disease. Time has proved its futility as a specific germicide, however, in that dread plague, and no one with practical experience now believes it to have the least effect upon the tubercle bacillus within the body. The most it can do is to favor expectoration, lessen fetor of the excretions, and if not carried too far, stimulate digestion. The apparent good it has accomplished as an antiseptic expectorant is more than offset by the disturbing action it has had upon the stomach; for to produce much effect it must be given too long and in doses too large to insure the safety of good digestion. When taken for a prolonged period the patient becomes possessed of a disgust for medicine and food, and gastro-intestinal irritation becomes so pronounced as to induce nausea, vomiting and diarrhœa, with the nervous depression that results from such a condition. It is far better, in consumption, to resort to milder means which conserve the powers of digestion than to risk the use of any medicine which, given beyond the narrowest bounds, creates a barrier to good digestion and assimilation. It were better to confine the use of creosote wholly to inhalations, which really do some good, and dispense altogether with its internal exhibition in phthisis. Much of the good that has followed its employment has come from the concurrent use of oils and fats, good hygienic measures, and properly selected foods.

Some prefer to use Creosote Carbonate, a sticky liquid but of scarcely any taste or odor. The dose is from 1 to 20 grains. Creosote is one of the fetishes of medicines, the failure of which to fulfill the preposterous claims of its advocates has helped largely to encourage faith in the so-called art of drugless healing.

CRETA PRÆPARATA.

Prepared Chalk, Drop Chalk. (Formula: $CaCO_3$).

Chalk, prepared from native calcium carbonate by processes of levigation, elutriation, and drying.

Description.—A white or grayish-white, non-crystalline powder, or conically moulded drops, without odor or taste. Insoluble in water and alcohol; produces salts in solution by the action of acetic, hydrochloric or nitric acid, with strong effervescence. *Dose*, 15 to 60 grains.

Preparations.—1. *Pulvis Cretæ Compositus*, Compound Chalk Powder. (Prepared Chalk, Acacia, Pulverized Sugar.) *Dose*, 30 to 60 grains.

2. *Mistura Cretæ*, Chalk Mixture. (Compound Chalk Powder, Cinnamon Water, Water.) *Dose*, 4 fluidrachms.

Related Salt. *Calcii Carbonas Præcipitatus.* Precipitated Calcium Carbonate, Precipitated Chalk. A fine white tasteless and odorless powder. *Dose*, 15 to 60 grains.

Action and Therapy.—*External.* Prepared chalk is antacid, astringent, detergent, and sedative to the mucous membranes, and is frequently incorporated into liquid and powdered dentifrices. It forms a good dusting and absorbing powder to prevent chafing and excoriations, and for use upon skin diseases, and in excessive sweating; and as an absorbent and protective for burns and ulcers. Precipitated calcium carbonate is too gritty for use in tooth-powders.

Internal. Prepared and precipitated chalk are antacid, astringent and absorbent and act well in acidity of the stomach and in acid diarrhœa. Chalk mixture, with camphorated tincture of opium, is much used in diarrhœa with acid stomach and sour eructations and stools. Its use should be preceded by a saline purge or castor oil. It is little employed in Eclectic practice.

CROCUS.

The stigmas of *Crocus sativa*, Linné (Nat. Ord. Irideæ). Asia Minor; much cultivated in Europe.

Common Name: Saffron.

Principal Constituents.—Contains the glucoside *crocin* (polychroit—$C_{44}H_{70}O_{28}$) and *picro-crocin* or *saffron bitter* ($C_{38}H_{66}O_{17}$).

Preparation.—*Tinctura Croci.* Tincture of Crocus. *Dose*, 1 to 60 drops.

Action and Therapy.—Reputed diaphoretic and emmenagogue, this agent was formerly used in amenorrhœa, dysmenorrhea, and suppression of the lochia. Five-drop doses of the tincture of crocus is advised for menorrhagia, with dark clotted losses; and the infusion (Saffron, ℥i; hot water, Oj), in doses of 1 to 3 fluidounces to hasten the appearance of the eruption in measles. It must not be confounded with "Dyer's Saffron" (*Carthamus tinctorius*), which see under *Carthamus*. It may be used to color tinctures orange yellow, but it is too expensive for that purpose.

CUBEBA.

The unripe, full-grown fruits of *Piper Cubeba*, Linné, fil. (Nat. Ord. Piperaceæ.) Java, Borneo, Sumatra, Prince of Wales Island, and other isles of the Indian Ocean. *Dose*, 5 to 30 grains.

Common Names: Cubeb, Cubebs.

Principal Constituents.—A volatile oil (*Oleum Cubebæ*), *cubebin* (inactive), *cubebic acid*, and *cubeb resin*, the latter two forming a soft resin with diuretic properties. The irritant, stimulant, and carminative properties are possessed by the volatile oil.

Preparations.—1. *Specific Medicine Cubeba. Dose*, 1 to 30 drops.

2. *Oleoresina Cubebæ*, Oleoresin of Cubeb. *Dose*, 1 to 15 grains.

3. *Oleum Cubebæ*, Oil of Cubeb. *Dose*, 1 to 15 minims.

Specific Indications.—Gonorrhœa after discharges have almost ceased; enfeebled conditions of the large intestine and rectum; subacute inflammation of the urinary passages; urethral burning and scalding of urine in women; debility with profuse mucous discharges.

Action and Therapy.—Cubeba is mildly stimulant, expectorant, stomachic and carminative. It arrests excessive mucous discharges, particularly those of the urethra. Large doses quicken the pulse and increase its volume, and sometimes elevate the temperature; occasionally it causes nausea, vomiting, burning pain, griping and purging. Not uncommonly it produces a rash-like cutaneous eruption. It is eliminated by the urine and by the bronchial membranes, increasing normal and restraining abnormal secretions. It imparts its peculiar aromatic odor to the urine and to the breath.

Cubeb is employed to restrain mucous discharges after the subsidence of active inflammation, and usually after active discharge has nearly ceased. In late stages of intractable gonorrhœa in which there persists a small amount of flow, and in gleet, 30 grains of the powdered berries may be administered to awaken activity—to produce a substitutive inflammation—after which the case appears to improve. The drug should be pushed until urination is painful, and then lessened from day to day until a cure is effected.

While contraindicated in acute inflammation, cubeba is often of service in so-called chronic inflammations, especially in cystitis, and in chronic inflammatory states of the urethra in women. It first aggravates and then cures. The greater the debility the more it is indicated, and urethral burning is the chief indication for it. The urethral scalding sensations frequently experienced by women upon urinating, especially at the menstrual period, is greatly relieved by it, as is irritation and burning of the vulva. In these cases there is usually constant urging to pass urine, the effort being attended with much pain. Five (5) drops of Specific Medicine Cubeba should be given every 3 or 4 hours. The same dosage will often remedy nocturnal incontinence of urine in children.

Cubeba is useful in chronic sluggish sore throat, with relaxed membranes and over-secretion. From 5 to 10 drops of the specific medicine should be given suspended in syrup, and the same dose upon sugar is useful in chronic atonic respiratory catarrhs, with profuse expectoration, and for nasal catarrh.

Smoking cubebs is a popular method of treating nasal catarrh and hay fever. Care must be had not to blister the roof of the mouth, an untoward effect that is produced by the oil in a good quality of cubeba.

CURCUMA.

The rhizome of *Curcuma longa*, Linné (Nat. Ord. Zingiberaceæ). Southern and eastern Asia, and extensively cultivated in China, Hindustan, and other countries.

Common Names: Turmeric, Curcuma.

Principal Constituent.—*Curcumin*, a yellow coloring matter.

Preparation.—*Specific Medicine Curcuma.* (A coloring agent.)

Action and Uses.—While turmeric is a mild aromatic stimulant, it is almost wholly used as a test for alkalies, and to color ointments and other pharmaceutical products.

CUSSO.

The female inflorescence of *Hagenia abyssinica* (Bruce), Gmelin (Nat. Ord. Rosaceæ). Abyssinia. *Dose*, 4 to 5 drachms.

Common Names: Kousso, Kusso, Kooso, etc.

Principal Constituent.—*Kousin* (brayerin or *tæniin*).

Preparations.—1. *Infusum Kousso*, Infusion of Kousso. *Dose* (see below.)

2. *Specific Medicine Kousso. Dose*, 1 to 2 fluidrachms.

Action and Therapy.—Tæniacide and purgative. Kousso is among the rarely used though efficient anthelmintics for the removal of tapeworm. Being more or less irritant to the gastro-intestinal tract it is not always well retained by the stomach. About 4 to 5 drachms of the flowers are to be suspended in water, or made into an infusion, and taken in two or three doses at short intervals upon an empty stomach. Some prefer the fluid-extract in doses of 2 to 4 fluidrachms. Kousso is liable to fail unless made fresh and in prime condition.

CYPRIPEDIUM.

The rhizome and rootlets of *Cypripedium pubescens*, Swartz; and of *Cypripedium parviflorum*, Salisbury. (Nat. Ord. Orchidaceæ.) Rich woods of the United States. *Dose*, 5 to 60 grains.

Common Names: (1) Ladies' Slipper, Yellow Ladies' Slipper, American Valerian, Yellow Mocassin Flower, Nerve Root; (2) Small-flowered Ladies' Slipper.

Principal Constituents.—A volatile oil, tannin and gallic acids, a volatile acid, resins, and inorganic salts.

Preparation.—*Specific Medicine Cypripedium. Dose*, 5 to 60 drops.

Specific Indications.—Insomnia, nervous irritability, neuralgia and delirium, all from atony; restlessness and muscular twitching, typhomania and tremors in low forms of fever; wakefulness from mental unrest; menstrual irregularities, with despondency; tendency to dementia at the climacteric; mental depression from sexual abuse.

Action and Therapy.—All of the species of Cypripedium resemble valerian in their effects. They are excellent nerve stimulants for weak women and nervous children. They improve a feeble circulation and increase the innervating power of weakened nerve centers. Though comparatively feeble agents, they are nevertheless important medicines, being of that type of drugs which silently do great good without marked physiological disturbance.

Cypripedium is an ideal tranquilizer for states of nervous excitability or irritability depending upon atony. It dispels gloom, induces a calm and cheerful state of mind, and by thus inducing mental tranquillity favors restful sleep. When nervous irritability is caused reflexly by pelvic disorders it is especially a useful drug. If due to organic disease it is less effectual than in merely functional disorders.

We value cypripedium highly for the hypochondria of the menopause. We have been able to accomplish more with it than any drug except pulsatilla in worry, with fear of disaster or insanity, in women passing through this phase of life. It is useful in melancholia and sleeplessness due to menstrual irregularities, after prolonged and severe pain, and in those the result of nocturnal losses. It relieves the nervous unrest attending gleet, and the sexual erethism of debility. In the typhomania and tremors of low fevers it is a safe and often effectual drug, but like all others in these conditions it frequently fails to give relief. It acts well after long sieges of exhausting diseases to give nerve tone and allay the nervous manifesta-

tions of general debility. An excellent soothing syrup for irritable children, especially during dentition, was proposed by Scudder: ℞. Specific Medicine Cypripedium; Compound Tincture of Lavender, aa fl℥iij; Specific Medicine Lobelia, fl℥j; Simple Syrup, q. s. fl℥iij. Mix. Sig.: Dose, 5 to 20 drops. If nausea occurs lessen the amount of, or omit the lobelia.

CUPRI ACETAS.

Cupric Acetate, Copper Acetate. (Formula: $Cu\ (C_2H_3O_2)_2 + H_2O$.)

Description.—Dark-green, small, prismatic crystals, inclining to a bluish color, efflorescent, of a nauseous, metallic taste, and faint acetous odor. It dissolves in water and alcohol.

Preparations.—1. *Tinctura Cupri Aceti Rademacheri*, Rademacher's Tincture of Copper Acetate. *Dose*, 1/20 to 1 drop.

2. *Specific Medicine Cuprum. Dose*, 1/20 to 1 drop.

Specific Indications.—Skin tawny, dirty, yellowish, greenish, pallid or waxy; parts usually red are pale or greenish; tongue broad, uncoated, and pale; sluggish bowel action, with colorless discharges, or if loose, with pale rice-water stools; anemia, without much loss of flesh, and dirty, greenish tinge of skin; chlorosis; tissues full, soft and doughy; skin pale and transparent after hemorrhages or exhaustive discharges.

Therapy.—Scudder was the chief advocate of copper medication in the Eclectic school, advising it chiefly as a blood-maker. A favorite method was the administration with the food of pickles prepared by the old-fashioned method in copper kettles. He also favored the tincture of the acetate as devised by Rademacher. The conditions in which it sometimes acts beneficially are anemia, chlorosis and leucocythemia, with general weakness, flabby flesh, and full but soft pulse. Under its influence the flesh becomes firmer and general blood-making is improved. The indications are those set forth above. Copper salts in minute doses are sometimes useful in the dry scaly skin eruptions in which arsenic is useful.

CUPRI SUBACETAS.

Subacetate of Copper, Cupric Subacetate, Verdigris.

Description.—An impure mixture of several basic acetates of copper, occurring in irregular greenish-blue or bluish-green lumps, interspersed with light-green blotches, of a styptic, nauseous, coppery taste, and when powdered, of a disagreeable acetous odor. Water partially dissolves it, at the same time decomposing it. It is best used in powder or ointment.

Action and Therapy.—*External.* Verdigris is poisonous and its effects and antidotes are those of copper poisoning. (See *Cupri Sulphas.*) This salt is used only externally. It is useful in powder form, to remove syphilitic verrucæ, fungous growths, and callous edges; and, in ointment, as a parasiticide in various forms of tinea, especially that of ringworm of the scalp.

CUPRI SULPHAS.

Copper Sulphate, Blue Stone, Blue Vitriol. (Formula: $Cu\ SO_4 . 5\ H_2O$.)

Description.—Large, deep-blue, transparent crystals, slowly efflorescent in the air; or a blue, granular powder. Copper sulphate has no odor, but is nauseous and metallic to the taste. It dissolves freely in water and sparingly in alcohol. *Dose*, 1/20 to 1/2 grain; as an emetic, 3 to 5 grains.

Action and Toxicology.—Copper sulphate is irritant, astringent, and corrosive. Very minute quantities destroy low forms of plant life, it being now a common custom to kill algæ in ponds and typhoid germs in water supply with copper salts. In moderate doses it causes vomiting. Large amounts produce gastro-enteritis, with violent vomiting and purging, and

resulting in corrosion of the mucosa. Other symptoms of poisoning are headache, spasms, jaundice, cold clammy skin, failing respiration and circulation, delirium, coma, and arrest of the secretion of urine. Death is rare from this salt, and when it does occur it is usually sometime after its ingestion, the breaking down of tissues being a secondary result of the primary congestion. Copper salts appear to have an affinity for the hæmoglobin of the blood, forming with it a compound known as cuprohæmol. Copper is stored in the liver chiefly, and in the spleen, kidney and thyroid, and is excreted by the bowels, the urine, the milk, and the saliva. It may be absorbed from denuded surfaces. In cases of poisoning use pure reduced iron, yellow prussiate of potassium (ferrocyanide of potassium), empty the stomach by means of the stomach pump, or apomorphine hydrochloride hypodermatically and give demulcents and albumens freely. Treat after-symptoms symptomatically.

Chronic Copper Poisoning. Workers in copper, though not acutely poisoned by it, through constant exposure to the copper dust and its impurities, become somewhat anemic and experience lassitude, vertigo, headache, aphonia, profuse greenish perspiration, tremors, and catarrhal and gastro-intestinal disturbances. The gums present a peculiar greenish or olive-colored line. This condition of chronic poisoning is best combated by frequent saline cathartics, dilute phosphoric acid (10 to 15 drops) before meals, and the liberal use of milk.

Therapy.—*External.* Copper sulphate crystal has been used upon granular lids and is a relic of barbaric treatment. It is, however, quite effective, and probably less painful than silver nitrate. It is best adapted to granular conjunctivitis and to the transitional stage from acute to chronic trachoma, with pale, indolent follicles, and in very chronic trachoma with cicatricial tissue and granulations undergoing atrophy. The same treatment may be applied in tinea tarsi. It may also be used upon sluggish ulcers, warts, fungoid growths, callous edges, and chancre. Most of these uses are, however, archaic, and are only resorted to in rare instances at the present day. A 10 per cent solution destroys fungous growths (thrush) in the ear, and is a good cauterant after the removal of tympanic steatomata. A lotion (1 to 250) is a good astringent for granular diseases of the eye, and for chronic conjunctivitis (1 to 500). Stronger solutions (1 to 200) are useful as washes for malignant sore throat, leucorrhœa, and as a wet dressing for rhus dermatitis. A hot rectal injection (2 grains to the pint) of copper sulphate is said to kill the endamœba causing amœbic dysentery.

Internal. Copper sulphate in doses of 3 to 5 grains is a quick and efficient emetic in narcotic poisoning. It acts without nausea and depression. If it fails, however, it must be quickly removed from the stomach, lest irritant after-effects result. It is especially valued in phosphorus poisoning. Small doses of copper sulphate (1/2 to 1 grain) have been advised in actinomycosis, and very small doses in chronic diarrhœa in exhausting diseases, with mucobloody and partially feculent feces. Scudder believed it a blood-maker and advised it for the same purposes as for Acetate of Copper. (See *Cupri Acetas*).

Drinking-water supply of springs and reservoirs suspected of containing typhoid germs should be treated with copper sulphate in the proportions of 1 part of the salt to 5,000,000 to 50,000,000 of water. These proportions are harmless to human beings and animals, but destructive to typhoid bacilli.

DIASTASUM.

Diastase.

A mixture of starch-converting enzymes derived from the infusion of malt.

Description.—An amorphous yellowish-white powder, or translucent scales, without taste or odor; soluble in water (turbid); practically insoluble in alcohol. It should convert into sugar not less than 50 times its weight of potato starch. *Dose*, 5 to 15 grains.

Specific Indications.—Faulty digestion of starch; amylaceous dyspepsia.

Action and Therapy.—Diastase is a digestant of starch, converting that substance into sugar in the stomach when the acid content of the gastric juice is not over 0.1 per cent. It also digests starch in the mouth. The chief use of diastase is in so-called *amylaceous dyspepsia* and to split the starches in infant feeding where starch gruels are employed. It acts similarly to pancreatin and is used for much the same purposes.

DIGITALIS.

The leaves of *Digitalis purpurea*, Linné (Nat. Ord. Scrophulariaceæ), carefully dried and preserved away from light, in close containers. Europe; cultivated in Europe and to some extent in America. *Dose*, 1 to 2 grains.

Common Names: Foxglove, Purple Foxglove.

Principal Constituents.—The glucosides *digitoxin* (very toxic and cumulative), *digitalin*, *digitalein*, *digitonin*, and digitin (inert); digitalic and antirrhinic acids, volatile oil, etc. There are no positively determined alkaloids in digitalis.

Preparations.—1. *Specific Medicine Digitalis. Dose*, 1/5 to 1 drop.

2. *Infusum Digitalis*. Infusion of Digitalis. (A cinnamon-flavored, 1 1/2 per cent, infusion). *Dose*, 1 to 2 fluidrachms.

3. *Tinctura Digitalis*, Tincture of Digitalis (10 per cent of drug). *Dose*, 1 to 10 drops.

Doses of Digitalis Glucosides:—Digitoxin, 1/300 to 1/64 grain; digitalin (crystallizable), 1/300 to 1/100 grain, (amorphous and German), 1/100 to 1/30 grain, (digitalin is so variable that it should not be used; it may be very actively poisonous, or may be nearly inert); digitalein (water soluble), 1/200 to 1/100 grain.

Specific Indications.—Weak, rapid, and irregular heart action, with low arterial tension; broken compensation; weak, rapid, flaccid pulse; weak heart sounds; dusky countenance, with dyspnœa, cough, jugular fullness, and weak cardiac action; œdema, anasarca, or ascites with scanty supply of dark-colored urine, with weak heart action; renal congestion; irritable heart with weak action; heart made to beat rapidly but feebly by slight excitement; continuous labored breathing with weak pulsation; renal and cardiac dropsy; desquamative nephritis, with weak heart; capillary hemorrhage; poisoning by aconite, muscarine, or the nitrites.

Action.—The dominant action of digitalis is upon the circulation, but it has no perceptible effect upon the blood. Full or even moderate doses may excite nausea and vomiting, and a greenish or yellowish diarrhœa. These effects are preceded by considerable prostration. If the stomach is already irritated, or there is gastro-intestinal irritation, these disturbances are more certain to occur. Only in toxic amounts does digitalis affect the respiration, first slowing and deepening, and finally accelerating the breathing. Neither do other than poisonous doses impress the nervous system, and then it lessens reflex activity through stimulation of Setschenow's center of inhibition in the medulla, and is followed by depression of the spinal cord and motor nerve trunks and by eventual paralysis of the muscles. These extreme effects on the nervous and respiratory systems

have only been noted in animals; apparently they do not take place in man. Therapeutic doses, however, stimulate the cardiac inhibitory and vaso-motor centers of the medulla. Digitalis, in moderate doses, has little or no effect upon temperature, but poisonous doses lower it. When fever is present, however, it actively reduces the body heat, yet it is not a good nor safe antipyretic. It has been conclusively proved that high temperature prevents digitalis from slowing the pulse.

In moderate doses digitalis slows the heart-action, increases the force of the pulse, and from these effects chiefly, raises blood-pressure. The diastole is prolonged and the systole is increased in vigor. The result of the stronger systole is to reduce the number of pulsations. Not only does the retarded diastole give more rest to the heart, but it is followed by a better contraction of the heart-muscle and some constriction of the arterioles, so that the blood-current is reduced in size and the quantity of blood sent out through the systemic arteries is lessened. The narrowed arterial resistance and the stronger systolic contraction are the chief causes of increased blood-pressure, though to a limited extent, especially when larger doses are given, the vaso-motor apparatus exerts some control, as does also a direct impression of the drug upon the walls of the vessels. All of the above effects are those of *stimulation*, never of depression, and digitalis, in such doses, is therefore a heart stimulant and heart tonic. When carried to extremes the tonic effects may be overreached, and then the condition verges into exhaustion from over-stimulation of the heart-muscle and from a failure of the normal impulse conduction from auricle to ventricle. This is particularly evident when a person taking full and repeated doses of digitalis suddenly collapses when raised from a recumbent to a sitting posture. So powerful is the effect upon the heart-muscle that tetanic contraction may occur and prevent a passage of blood through the heart, the tonic spasm resulting in syncope; and the exhaustion and syncope are so great as sometimes to prove fatal.

The effects of digitalis may be conveniently studied under three heads, or stages, representing, however, but continuous action under normal and increased dosage rather than three actually separate conditions: (1) The therapeutic; (2) the toxic; and (3) the extreme toxic or lethal stages.

(1) In the therapeutic stage the rhythm is slowed and the ventricles empty themselves more perfectly and by their increased force pump more blood into the vessels. The diastole being greatly prolonged and the force of the systole increased, there is produced a larger though less frequent pulse wave. The auricles are less affected than the ventricles, but on the whole the heart does more work, and were it not for the increased resistance in the vessels and lessened number of contractions more blood would be propelled into the body. As it is, the current is carried more completely to the extremities of the capillaries, and altogether the circulation is improved.

(2) The second stage is sometimes absent. It takes place when the drug is given in overdose or for a continuous period without rest. The pulse becomes very slow and irregular. The ventricle dilates more completely, thus prolonging the diastole; the systole becomes erratic in force, the auricular contractions approach failure, or become greatly at variance in rhythm with those of the ventricles. The action is rapidly going through

the transitional passage from the therapeutic to the extreme toxic stage. Now follows interference with the normal transmission of impulse and contractile wave from the sino-auricular node by way of the bundle of His. Some or all of the waves fail to pass from the auricles to the auriculo-ventricular junction (heart-block) and thence to the ventricles, the result being that incoördinate action develops. The ventricles, failing to receive the normal impulse, may fail to contract; or if they contract, do so by originating their own impulse. This, then, being at variance, both as to origin and time, with that of the auricle, causes one or more skipped beats (dropped beats), the ventricles usually contracting about half as many times as the auricles. This action progressing and increasing, the third or deeply toxic stage sets in.

(3) The third stage is marked by rapid ventricular action and consequent racing of the pulse, which becomes extremely irregular and often shuttle-like in action. This is due to increased excitability of the heart-muscle to such a degree that centric nervous inhibition no longer has any control over the heart. The arrythmia between auricle and ventricle is exaggerated and double, and triple extra-systoles spontaneously are developed. The final result is such a disorganized coördination or confusion of action that the circulation cannot be maintained—a state well named *delirium cordis*—and the heart finally stops in extreme dilation.

The effects of the first stage are due largely to vagal inhibitory activity and to direct action of the drug upon the heart-muscle itself. The second stage is due to excessive inhibition, while the heart-muscle seems to play a minor part; the third stage is attributed solely to spontaneously increased excitability of the heart-muscle, which rapidly increases the arrythmia, occasions the extra-systolic beats, and lastly fibrillation. Throughout digitalis intoxication the ventricles contract in unison, as do also the auricles, but the disparity in action between the auricles and ventricles displays a great variation from each other in rhythm.

Having the foregoing effects of digitalis in view, it is clear that it acts directly upon the heart-muscle, affecting the rate and rhythm of its action. It regulates contractility, irritability, and directs the conductivity of the contractile impulse by way of the aurico-ventricular bundle of His, whenever these functions are faulty. It also influences the nutrition of the heart permanently by allowing a more perfect supply of blood to the walls of the organ itself through the coronary circulation. The slowing of the disastole is due to stimulation of the vagus, both at its origin in the medulla and at its termination in the heart. The increased blood pressure is due chiefly to causes named above and to the vaso-motor control and the effects of the drug upon the vascular walls. Therefore we may sum up the medicinal action of digitalis upon the circulation as one of stimulation, giving both power and rest to the heart by prolonging the intercontractile period, and making its action more deliberate, and in its inhibition of the pneumogastric, slowing and strengthening the pulse.

Digitalis often increases the flow of urine, but many affirm that digitalis has no direct diuretic power. In health it is known to generally lessen the secretion of both the solid and fluid constituents of the urine. Some contend that it slightly increases the flow of urine. It is more than probable

that, when diuresis is the result, it is in cases in which a diminished secretion of urine is due to debility or some other form of cardiac embarrassment. Others, however, maintain different views, and Brunton asserts that diuresis produced by it in dropsy is due to a special action of the drug upon the Malpighian bodies, and not to augmented blood pressure alone. In overdose digitalis may cause spasm of the renal vessels, with consequent anuria and symptoms of cumulation. In woman, digitalis, like ergot, causes contraction of the uterine fibers of an enlarged or gravid uterus, thereby arresting hemorrhage; in man it primarily lessens the supply of blood to the erectile tissues of the penis, preventing or enfeebling erections and consequently diminishing the venereal desires.

The manner of elimination of digitalis is unknown, it being the general belief that it is taken up by some tissue in the body or becomes oxidized. At any rate none can be detected in the urine. Nor is there unanimity as to the question of tissue waste, some declaring it to increase, others to decrease the output of urea.

Digitalin, digitalein, and digitoxin are powerful heart-muscle stimulants; digitalin also stimulates the vagus; all three cause a rise in blood pressure through vaso-motor action. Digitonin seems to oppose these glucosides, acting as a check, for it depresses both the heart-muscle and the vagus.

Toxicology.—In connection with the toxic symptoms above noted, attention may be directed to the special signs of digitalis poisoning. These are, first, a slow, full pulse reduced to about half the number of normal beats, followed shortly by a tumbling or hobbling dicrotic pulse, or a shuttle-like action, with tumultuous heart-beat. In short of lethal doses the pulse may remain full and slow as long as the patient remains recumbent, but immediately upon rising it becomes rapid and irregular. There is nausea, occasionally anxiety and salivation, a sense of weight, or constriction, obtuse pain in the head, giddiness, disordered vision, mental disturbance, and rarely spectral illusions; not unfrequently a huskiness of the voice is present, the result of irritation of the fauces, trachea, etc. The nausea produced by digitalis, and more quickly by digitalin and digitoxin, is preceded by malaise, faintness, and depression, and is exceedingly distressing. Vomiting temporarily relieves it, the vomited material being first dark-green, afterward yellow. Prostration becomes so great that the individual can not stand without help, and an intense disgust for food is experienced. Familiar objects are unrecognizable—a disturbed vision with yellowness or blueness supervening. Persons are recognized only by their voices. These effects, if not fatal, may last several days, the sleep being disturbed by nightmare and general unrest. Finally sound sleep and a voracious appetite quickly restore the individual to normal health. Exophthalmos occurs in many instances and the sclerotic is said to take on a peculiar bluish, pearl-like appearance. Death, when it occurs, is usually preceded by coma. Poisoning from cumulative doses early recognized usually clears up upon discontinuing the use of the drug.

Poisoning by digitalis may be produced by 1/16 grain of digitalin (equal to 8 grains of good powdered digitalis leaves), and Taylor (*Medical Jurisprudence*, page 229) states that doses of from 1/4 to 1/2 grain would

probably produce death. If a true and uniform digitalin could always be obtained there would be much less uncertainty concerning its strength and value. Cold, belladonna, ergot, etc., increase the activity of digitalis, while aconite opposes its action. The latter is now considered the best and most available physiologic antagonist. According to Bartholow, the most complete antagonist to digitalis, physiologically speaking, is saponin. Strychnine is also a physiological antagonist.

The poisonous effects of digitalis are best counteracted by first evacuating the stomach by the free use of warm liquids and mechanical emetics, if any of it is supposed to remain in the stomach, and then administering brandy, wine, opium, black coffee, ammonia, ammonium carbonate, or other stimulants, with sinapisms to the wrists and ankles. Both external and internal heat should be used. A solution of tannic acid is of service, by forming an insoluble tannate of digitalin. Preparations containing tannin, such as tea, etc., may be given. After death from digitalis the gastric membranes were found partially inflamed and the meninges of the brain much injected (Taylor).

Therapy.—*External.* A poultice prepared from bruised digitalis leaves and warm water, or the tincture incorporated into a warm flax-seed poultice, has given relief in renal congestion and urinary suppression. It is a dangerous procedure, however, as there is no way of determining the quantity absorbed, and death has been known to result from excessive urination and exhaustion.

Internal. William Withering, in 1785, after ten years of experimentation—and clinical uses of digitalis in dropsies—begged leave to submit, among others, the following "inference": "That it has a power over the motion of the heart to a degree yet unobserved in any other medicine, and that this power may be converted to salutary ends." Thus was digitalis prophetically introduced into legitimate practice as a heart medicine.

Digitalis is preëminently the foremost heart medicine of to-day. It slows and strengthens the contractions, prolongs the intercontractile period, and thus gives both rest and power to that organ. It also contracts the capillaries to some degree, and chiefly through a more forceful output raises arterial tension, or as more commonly stated, raises blood pressure. There is also good reason to believe that through the influence of the vagi, which are probably trophic as well as inhibitory nerves, it improves the coronary blood supply and nutrition of the heart-muscle, though in this respect it has little or no advantage over cactus. Digitalis also has some value as a diuretic in disease, but it probably does not so act, to any degree at least, in health. Digitalis is the remedy for rapid and feeble heart action, with lack of propulsive power, lowered arterial tension, and deficiency of the urinary secretion. Therefore it is extremely valuable where there is a loss of, or broken, compensation, in moderate and acute dilatation, with mitral insufficiency, or in dilatation of the right heart, resulting from valvular (tricuspid) insufficiency, in weakness of the heart due to shock, injury, hemorrhage, aconite or mushroom or other poisoning, and in the heart weakness following low and septic fevers and pneumonia, in mitral stenosis and regurgitation, and in debility of the heart-muscle.

The true remedial power of digitalis is displayed in the treatment of asthenic heart diseases. It is one of the few drugs that act upon and correct organic changes in the heart structure; for among the other effects it will make the human pump fit its valves. Its power to cause strong and steady contractions of the cardiac muscle with consequent adaptation of the rings, or auriculo-ventricular orifices, its ability to raise blood-pressure, and in many instances its capability of increasing the renal function, make it by far the most generally useful of heart remedies. Locke was right when he declared digitalis "the true opium for the heart." It sedates (through stimulation) and gives comfort, steadies the heart-action, relieves dyspnœa, gives rest and sleep when disturbed by faulty circulation, and in dropsical conditions due chiefly to cardiac inefficiency assists in reducing œdema. The indications are distinct and must be followed: the weak, rapid, and irregular heart, feeble propulsion and low arterial tension. Harm nearly always comes from its use, even when used in ordinary doses, when there is a strong, vigorous heart action, with high blood pressure. Digitalis is therefore a remedy for cardiac asthenia and organic debility. A caution worth mentioning is that physicians often judge heart action merely by "taking the pulse", and are thereby deceived as to the true condition of the heart. There are times when the pulse may be almost imperceptible, and yet, when the ear is placed to the chest wall it will detect a hard-working heart, which has all or more contractile force than it can maintain. Vaso-motor control is at fault and then digitalis will do harm rather than good.

Digitalis is of great value in chronic valvular cardiac disease, with failing or broken compensation, but it must be used with judgment, observing the need in the weak, fast, and irregular pulse, deficient urination, and dropsy. When hypertrophy of the heart overbalances dilatation, and evidences of arterial hyperæmia are present, digitalis is likely to aggravate the condition, or otherwise do harm.

Digitalis medication is most effective probably in mitral insufficiency, with regurgitation, provided there are no pericardial adhesions restraining its effects, or advanced myocardial degeneration. It overcomes the ventricular strain dependent upon pulmonic vascular resistance, and helps, by contracting the ventricle rings, to attain a more perfect closure of the mitral valves.

In mitral stenosis, so often associated, as it is, with degeneracy of the heart structure, digitalis is a less useful remedy and may even cause harmful effects. When a failure of the right ventricle can be ascertained, and there is dropsy with anuria, it may be used, and probably to good effect. Theoretically the drug should do good in mitral stenosis, for it gives, under normal structural integrity, more power to the ventricular contractions, and by prolonging its relaxation allows a greater time for the blood to pass from the upper to the lower chamber, but the diseased myocardium may prevent it doing good work.

In tricuspid stenosis and insufficiency, with regurgitation, it is regarded as less useful than in mitral affections, but when the valves are not diseased and there is simply ventricular dilatation, it may be of use. In these conditions, when the cardiac action is weak and rapid, pressure low, and there is cough, shortness of breath, dusky countenance, pulsating jugulars, scant,

high-colored urine, and general œdema, it may be used to advantage. Sometimes it has induced pulmonary hemorrhage.

Digitalis is generally regarded as less useful, rarely indicated, and even generally harmful in aortic stenosis. If, however, there is dropsy and evidence of back pressure in the lungs, it may sometimes do good.

In aortic regurgitation it is generally held to be harmful, but there are conditions which require nice discrimination as to its use. If there is great ventricular dilatation giving rise to mitral insufficiency, and when sudden dilatation with symptoms of venous stasis appears, and there is præcordial pain, dyspnœa, and great anxiety, the drug is held by some to do good, though it must be tentatively given and its effects carefully watched. In all varieties of aortic valvular disease, the greatest of care and vigilance should be exercised in the giving of digitalis. The indications of heart weakness and irregular pulse should be strictly observed.

In the treatment of all valvular disorders less therapeutic value is attached to the consideration of valves affected than to the condition of the heart-muscle itself. When so weak as to cause dilatation, and this effect has been brought about by valvular insufficiency, the drug is generally indicated.

Digitalis has long been the best remedy for rapid and unequal circulation, with a confusion of weak and vigorous but rapid pulsations. The cause, however, of this state has only recently been determined. This is now familiar as "auricular fibrillation," a condition exhibiting an exceedingly irregular and fast pulse, varying greatly in rhythm and power. Some of the ventricular contractions prove too feeble to force the blood-current into the aorta, while others are so vigorous as to cause large and full pulses. All of this occurs in the greatest confusion and without any regulated sequence. A rollicking, tumbling and jumbled irregularity of the radial pulse is the clinical evidence of this state. Fibrillation is caused by a disturbance of conductivity and is the result of the occurrence of a multitude of impulses generated in the auricle, throwing that chamber into a continual condition of incoördination, preventing the normal discharge of blood into the ventricle. These erratic impulses proceed downward into the ventricle with discordant irregularity, and thus cause an intercharge of weak and strong pulsations and a badly confused action of the whole heart. Not immediately fatal, the general health after some time may become undermined unless relief be given, and sudden and alarming rapidity of the pulse, and grave danger to the circulation and to life ensues.

Digitalis is the best-known remedy for this state, being practically specific, and this control of conditions under the drug is one of the most certain of therapeutic effects. Fibrillation is not due to vagal inhibition, but evidently originates in the cardiac muscle. Most likely it is occasioned by extreme malnutrition of the heart. Full doses of digitalis are required, and under them the pulsations are rapidly reduced to less than half in number, and they become augmented in power and volume and are more uniformly timed. This action of digitalis is one of control and not always curative, for the determining causes of fibrillation may persist through life and the drug must consequently be frequently and long invoked to maintain a fairly regulated circulation. It must be known, however, that over-

doses of digitalis sometimes bring on a state similar to if not identical with auricular fibrillation, when the heart has shown no such disturbance before the drug was taken. In such cases the dose must be lessened or the drug entirely withdrawn and strophanthus or convallaria substituted for it.

Digitalis is of value in irritable heart with palpitation from overwork, heart strain, and the arrythmia of simple dilatation, in moderate degrees of ventricular dilatation, and cardiac asthenia. It is especially commended for the irritable heart of soldiers brought on by long marches and fighting whereby the inhibitory control is lost or lessened and exhaustion of the heart-muscle is imminent. When palpitation is purely nervous, it is of little value; cactus is then a better remedy. It also fails often in paroxysmal tachycardia, which is also mostly a nervous phenomenon. In Grave's disease, it is not curative, but sometimes rectifies the cardiac irregularity. In functional palpitation arising from imperfect digestion it sometimes controls the heart symptoms, but gives little or no relief if the trouble is purely nervous, nor does it aid the stomachic disorder.

Cardiologists agree quite generally that digitalis is contraindicated in beginning or partial heart-block, which it tends to increase; that it is useless, and may be harmful in sinus arrythmia; that it is of doubtful value in pulsus alternans, especially doing harm if there is myocarditis, with sclerosis of the coronary arteries; and in paroxysmal tachycardia, in which, however, it may benefit by retarding conduction if the beats are of sinus node or auricular origin, but is bad medication if they are of ventricular inception. Digitalis is also of questionable value in auricular flutter. In fact, in our own opinion, in all forms of arrythmia great care must be had in the use of this powerful drug, and in most of them it had better be withheld, except in auricular fibrillation, in which its effects are all that may be desired.

The dictum, so much heard at present, to "digitalize your patient", must be followed with judgment, for digitalis cases, it must be remembered, are those which are helped greatly or moderately, those in which no good effect may be expected, and those in which it is dangerous, or at least harmful. One should not use digitalis indiscriminately, but with rare judgment and according to the specific indications, especially taking into account primarily the condition of the heart-muscle and its ability to meet the conditions imposed upon it.

To sum up its cardiac therapy, digitalis is useful in the following conditions: In structural heart lesions, as dilated heart with mitral incompetence, in mitral stenosis and regurgitation, and in dilated right heart with tricuspid incompetence, and in relative or positive debility of the cardiac muscle. The mechanical trouble in most instances is a state of ischæmia, or lack of sufficient arterial blood in the left heart, while in the right heart and the entire systemic and pulmonic circulation there is venous stasis. Digitalis increases the power of the auricles and ventricles to empty themselves; prolongs the inter-contractile intervals, thus allowing the auricles sufficient time to more perfectly send the blood current into the ventricles. It restores and regulates a mechanical compensation or balance in the circulatory organs. It controls fibrillation by inhibiting conductivity. The general symptoms leading to its selection are a weak, rapid, and irregular pulse, low arterial tension, cough, dyspnœa, pulsation of the jugular veins, a

cyanotic countenance, deficient urination, the secretion being high-colored, and œdema.

We have herein named many of the faulty anatomic conditions of the heart in which digitalis is useful, but as exact physical diagnosis is not always easy it is better for the practitioner to depend upon the symptoms of weak action than to attempt hair-splitting anatomic diagnoses. *Lack of propulsive power due to heart debility* is the best indication for digitalis. This, together with *threatened or actual failure of compensation*, covers in brief the great need of digitalis therapy. One should never lose sight of the fact that the *integrity and relative power of the heart-muscle* are of paramount consideration over that of the condition of the heart valves.

Digitalis is generally considered contraindicated in simple compensatory hypertrophy, aortic stenosis, extensive fatty, fibrous, or other degenerations of the heart-muscle, aneurism, and atheromatous or other structural changes in the arteries. As a rule it should not be employed in the heart affections of old age, or when dilatation is excessive, and particularly when there is a flabby state of the heart-muscle with suspected degenerative changes.

Cushny (*Pharmacology*) takes issue with some of the usual cautions given above, declaring that, while digitalis often fails in excessive degenerative conditions, it has no deleterious effect upon them. Neither does he fear rupture of the arterial walls or the presence of high blood pressure in renal and arterial diseases. He believes a greatly increased blood pressure is not likely under digitalis, nor is its occurrence to be regarded as a bar to the use of the drug, provided the special indications of "venous stasis, œdema, or deficient urine" are present. He presumes that, in some cases, the high blood pressure "arises from excessive activity of the vaso-constrictor center inducing mesenteric contraction in an attempt to maintain the blood supply to the brain; this involves an abnormal resistance to the circulation and imperfect nutrition of various organs. Digitalis by increasing the efficiency of the heart improves the blood supply of the brain, and the activity of the vaso-constrictor center is abated, leading to a more normal state of the circulation and often to a lower arterial tension." Notwithstanding this optimistic reasoning, physicians will do well to be extremely careful in the administration of digitalis in myocardial and vascular degenerations.

Bastedo (*Materia Medica, etc.*) declares that "the drug's efficiency is not to be estimated by its effects on arterial pressure", and that it is not contraindicated in aortic aneurysm, aortitis, or arteriosclerosis, but that "its use would depend upon the needs of the heart."

Under some circumstances digitalis proves a most certain but slow diuretic. It is most generally held that the diuretic effect of digitalis is the result of its secondary action. If, however, the view entertained by some that it has also a special action upon the renal glomeruli be true, the reason for its well-earned reputation as a remedy in dropsy will be more apparent. Digitalis has long been known as an efficient eliminant where the dropsical condition was dependent upon cardiac irregularities and upon renal congestion. When the trouble is cardiac in origin, it relieves by strengthening the heart action and producing capillary contraction. When of renal

origin, obstructing the circulation, it relieves at least the tension of the renal capillaries, thus lessening engorgement and bringing about absorption and diuresis. In general dropsy it is indicated by the distressing dyspnœa, especially when in the recumbent posture, fullness and pulsation of the jugulars, pale or dusky countenance, scanty and high-colored urine, and quick, feeble, fluttering, and irregular pulse. When known to be associated with the cardiac lesions in which digitalis is indicated, it seldom fails to remove the dropsical effusion. It relieves chronic nephritis by lessening vascular tension in the renal capillaries, and in granular degeneration of the kidneys it is said to benefit by lessening the proportion of solids excreted, while the quantity of fluid is increased. While of doubtful utility in scarlatina, it is very serviceable in the anasarcous condition sometimes following that disease. Many, however, regard it of doubtful safety in nephritis, and this is probably true of chronic nephritis without great cardiac impairment, but when the heart is greatly at fault and contributing to the intensity of the malady then digitalis should be of some service. Digitalis has no influence for good upon dropsy of hepatic origin, or in pleural effusion.

Rheumatism, with threatened heart failure, is sometimes relieved by digitalis. Owing to its power of preventing erections, by limiting the supply of blood to the erectile tissues, it has rendered good service in nocturnal seminal pollutions, particularly when the extremities are cold, the erections feeble, and the emissions oft-occurring.

Digitalis is not valued by us as a febrifuge. Its effect upon the gastro-intestinal tract is so unpleasant as to make it of doubtful value to lower temperature. As a sedative, therefore, in fevers and inflammations, its use is not to be commended. It has been claimed that it is of great service in scarlatina, both for the purpose of producing sedation and keeping the kidneys active, thus tending to avert post-scarlatinal dropsy and uræmia. That it will do this without some heart debility being present also, is by no means well established, while, on the contrary, its unpleasant, nausea-provoking properties make it an undesirable remedy. It is better after dropsy has set in. The same is true of it in typhoid and other fevers, though it may be used to strengthen a weak heart following these infections.

Digitalis is of value in the second stage of lobar pneumonia to preserve the integrity of the heart and circulation, when through swelling and exudation in the respiratory tract venous stasis is set up in the capillaries and the right heart dilates and the ventricle is incapable of forcing the blood current through the pulmonic vessels. Signally useful when this stage attains, it is a mistake to give it before such an accident occurs on the presumption that it will forestall the catastrophe. No drug, and certainly no potent drug, should be administered for any purpose until the indications show the need of it. Under similar conditions it is sometimes of value in acute bronchitis and bronchopneumonia in children.

As an antihemorrhagic digitalis has no special advantages, while it is open to the objection of forcibly pumping the blood; though in capillary bleeding from large surfaces it is sometimes said to be useful.

Digitalis is useful as an antidote to aconite poisoning, but is very slow in action, having to be first preceded by rapidly acting stimulants. It may

also be used to antidote the nitrites, and with atropine in muscarine (agaricin) poisoning.

Administration.—When given in large or in overlapping doses, digitalis may suddenly precipitate alarming conditions. This is due to inequality in the rate of absorption and elimination or destruction of the drug in the body. This state is the much feared "*cumulative action*," the possibility of which should never be forgotten when administering digitalis. The moment the appetite fails and the urinary secretion becomes diminished and the pulse becomes very slow and irregular, and headache, faintness and extreme prostration supervene, with sometimes nausea and vomiting, the drug at once should be discontinued. To avoid cumulative effects of digitalis it is customary to skip a day or two out of every week in its administration. Digitalis is slowly absorbed, and often much of it is destroyed in the gastro-intestinal tube. When through failure to be largely destroyed, or when through irritation of the tract more is absorbed than is apparent, the balance between absorption and the usual slow elimination is overweighted and cumulation occurs. When full doses of digitalis are being administered the patient should be kept recumbent in bed and not allowed to arise even to respond to the calls of nature. Failure to observe this precaution has resulted in sudden death from syncope.

When the desire is both to impress the heart and eliminate dropsical effusion the infusion of digitalis is the preferred preparation, as it is also in auricular fibrillation. Sometimes, however, a good digitalin, which should be employed only subcutaneously, is preferred when a quicker action is desired, but the variability of this product should always be taken into consideration.

Digitalis contains no alkaloid. At least five glucosides are present, some of which are intensely poisonous; some relatively negative; while one, so far as the matter is understood, antagonizes the other four. Besides two acids, the other constituents are those of plants in general.

Under the name digitalin, the glucoside said to most nearly resemble in action the whole plant, several preparations have appeared in the drug mart from time to time which have little agreement either in action or qualities. Discordant views of the value of such preparations, or of such preparations of the whole plant as are standardized to contain a certain percentage of certain of its active glucosides, illustrate forcibly that the experiences of careful clinicians should weigh more in the selection of a preparation of digitalis than should the dictum of the laboratory man with test-tube and guinea pig records, valuable as they may be in some directions. That preparation of digitalis which gives the desired therapeutic results with the least toxic impression is the safest and most sensible agent to employ, regardless of its glucosidal constituents and percentage.

Only such digitalins as are prepared by the processes of Schmiedeberg are favored by the best clinicians; the so-called German and French digitalins are unreliable, as they are all more or less mixtures of digitalin and other glucosides while the first is probably devoid of digitalin altogether, and is said to be in reality digitonin (saponin). Homolle's and Nativelle's digitalins are no longer favored by the majority of physicians. It is asserted that the "digitalone" devised by Houghton is a fat-free, standardized

composite of all the properties of digitalis; each ampule for hypodermatic use, equaling 16 minims, and each tablet from 3 to 16 minims, of tincture of digitalis. Digifolin, also representing the whole drug, acts very effectively in some cases when the tincture or infusion cannot be employed. However, for most purposes the crude drug in infusion, and the tincture, are the preferred preparations; in Eclectic medicine the specific medicine is most largely used and is fully representative of the best therapeutic virtues of good digitalis leaves, though less toxic than some other alcoholic preparations of the drug. The tincture made from the green drug, though less toxic than that made from the dried drug, is preferred by some.

DIOSCOREA.

The rhizome of *Dioscorea villosa*, Linné (Nat. Ord. Dioscoreaceæ). A vine found throughout the United States. *Dose*, 5 to 60 grains.

Common Names: Wild Yam, Colic Root.

Principal Constituents.—An acrid, alcohol-soluble resin, and a substance closely allied to saponin.

Preparations.—1. *Decoctum Dioscoreæ*, Decoction of Dioscorea (Dioscorea, ℥j; Water, Oj). *Dose*, 2 to 6 fluidounces.

2. *Specific Medicine Dioscorea. Dose*, 5 to 60 drops.

Specific Indications.—Bilious colic; other spasmodic colicky contractions; skin and conjunctivæ yellow, with nausea and colicky pain; tongue coated, stomach deranged, and paroxysmal pain in the abdomen; twisting or boring pain, radiating from the umbilical region, with spasmodic contraction of the belly-muscles; colic with tenderness on pressure, which gives relief to the spasmodic action.

Action and Therapy.—The decoction of dioscorea has been wonderfully effective in some cases of bilious colic and has signally failed in others. If it does not give relief in a half hour it is not likely to succeed. The specific medicine administered in hot water has the same effect. Dioscorea is probably less anodyne than antispasmodic, and it is due to the latter action that colic is relieved. Not alone does it succeed in cases of bilious colic, but it acts similarly in paroxysmal pain, with contraction of the muscular tissues, in cholera morbus, indigestion, and dysenteric tenesmus. Ovarian neuralgia and spasmodic dysmenorrhœa sometimes yield quickly to it. In all disorders it seems best adapted to irritable and excitable conditions and is less efficient when due to atony. Though dioscorea has been used largely for nearly a century, its true place in therapeutics is still undetermined, probably because so many impossible claims have been made for it. Hepatic colic depends upon so many different conditions that it may help some cases quickly while others are unaffected by it. When large gall-stones are attempting to pass it is probably without power to relieve. Morphine is a better relaxant and is anodyne. Dioscorea seems best adapted to paroxysmal pain due to contraction of the nonstriated musculature of tubular organs, when brought on by any irritant or form of irritation. It does not dissolve calculi. Usually, while there is much tenderness in cases requiring dioscorea, the distress is gradually relieved by pressure.

DRACONTIUM.

The rhizome, roots and seeds of *Dracontium fœtidum*, Linné (Nat. Ord. Araceæ). A peculiar plant found in moist grounds in the United States. *Dose*, 10 to 40 grains.

Common Names: Skunk Cabbage, Skunk Weed, Pole Cat Weed, Meadow Cabbage.

Principal Constituents.—A peculiar evanescent volatile substance, resin and volatile oil.

Preparation.—*Tinctura Dracontii*, Tincture of Dracontium (fresh root, ℥viij; Alcohol, Oj). *Dose*, 1/2 to 2 fluidrachms.

Action and Therapy.—In large doses dracontium will cause nausea and vomiting, dizziness, headache, and impaired vision. In small doses it is a stimulant, expectorant, and antispasmodic. It very markedly relieves nervous irritation with tendency to spasmodic action, making it a remedy of some value in nervous irritability, asthma, and whooping cough, and in chronic coughs and catarrhs. The drug needs restudy from a therapeutic standpoint, for it undoubtedly possesses a marked action upon the nervous system. Only preparations from the fresh root are of any value. Skunk cabbage was an ingredient of many early Eclectic medicines, and is still a constituent of *Acetous Emetic Tincture*, *Compound Emetic Powder*, and *Libradol*, the magma representing the latter compound.

DROSERA.

The herb *Drosera rotundifolia*, Linné (Nat. Ord. Droseraceæ). A small plant of the fly-trap family found in boggy situations of Eastern North America and Europe.

Common Names: Sundew, Round-leaved Sundew.

Principal Constituents.—Probably citric acid and a ferment capable of converting albumens into peptones.

Preparation.—*Specific Medicine Drosera. Dose*, 1/10 to 10 drops.

Specific Indications.—Expulsive or explosive spasmodic cough, with dryness of the air passages; cough of measles; whooping cough; uncontrollable, irritating cough.

Therapy.—Drosera, preferably in small doses, is of great value in the spasmodic dry cough characteristic of measles, and to a lesser extent for that of whooping cough and the irritability of the larynx following the latter. There may be simple irritation, particularly centered in the larynx, or inflammation may be present. It also relieves the tickling sensation in that organ giving rise to spasmodic cough. To a lesser extent it is useful in the coughs of bronchitis, incipient phthisis, spasmodic asthma, and in nervous or sympathetic cough occurring reflexly from other diseases. It probably acts upon the vagus.

DUBOISINA.

Duboisine.

The alkaloid obtained from the leaves of *Duboisia myroporoides*, Robert Brown (Nat. Ord. Solanaceæ), the Corkwood elm or Ngmoo of Australia and New Caledonia. *Dose*, 1/100 to 1/50 grain.

Preparations.—1. *Duboisinæ Sulphas*, Duboisine Sulphate. *Dose*, 1/100 to 1/50 grain.
2. *Duboisinæ Hydrochloridum*, Duboisine Hydrochloride. *Dose*, 1/100 to 1/50 grain.

Action and Therapy.—*External.* The sulphate of this alkaloid is sometimes used as a substitute for atropine as a mydriatic. Like atropine, it is contraindicated by glaucoma and diseases of the fundus of the eye on account of its power to increase intraocular tension. It is a more rapid mydriatic and paralyzes accommodation more quickly than atropine and is less irritant to the conjunctivæ.

Internal. Duboisine is very similar to, if not identical with, hyoscyamine, and the physiological effects of it are practically the same as those of the alkaloids of belladonna, hyoscyamus and stramonium. Sulphate of duboisine is an effective antagonist of muscarine and has been successfully employed in poisoning by mushrooms. It also checks colliquative sweating. It is reported prompter in action than atropine, and is said to be a better calmative and hypnotic in states of mental excitement. The morphine habit, paralysis agitans, and especially the excitability and insomnia of the insane have been treated with it. Administered in the smaller doses twice a day it is said to produce quiet, refreshing sleep. It frequently causes gastric disturbances, especially vomiting without previous nausea, and undoubtedly decreases the secretion of urine, hence it should be used with care and judgment.

DULCAMARA.

The young branches of *Solanum Dulcamara*, Linné (Nat. Ord. Solanaceæ). A vine common in Europe and the United States. *Dose*, 1 to 30 grains.

Common Names: Bittersweet, Woody Night-Shade, Scarlet-Berry, Violet-Bloom.

Principal Constituents.—The alkaloid *solanine* and the glucoside *dulcamarin*.

Preparation.—*Specific Medicine Dulcamara. Dose*, 1 to 30 drops.

Specific Indications.—Scaly skin affections; acute disorders due to cold and dampness; deficient capillary circulation; depressed secretions of the skin with urinous odor; coldness and blueness of the extremities; fullness of tissues with tendency to œdema.

Action and Therapy.—Dulcamara is an active agent capable of producing poisonous effects. These are those of the belladonna type, differing only in minor particulars. Cutaneous redness and congestion of the kidneys are especially apt to result from immoderate doses. Children are sometimes poisoned by eating the berries of the plant. Scudder suggested dulcamara in small doses in "cases of chronic disease in which the circulation is feeble, the hands and feet cold and purplish, with fullness of tissues and tendency to edema." Locke advised it in acute disorders brought on by cold, dampness, and exposure. Using it in fractional doses he suggested its value in acute catarrhal disorders proceeding from cold or suspended cutaneous function; in suppression of the menses with nausea, headache, and chilly sensation, the flow having been arrested by a cold; in vesical catarrh, aggravated by dampness; catarrhal headache from acute colds; nasal catarrh; retrocession of eruptions, or primarily to develop the eruptions; and in dyspnœa, cough and pain in the chest due to exposure. Those who dwell or work in damp or cold quarters, especially children, are frequently the victims of catarrhal diarrhœa, and acute and chronic rheumatism. Such patients are benefited by dulcamara given in fractional doses. Larger doses (medium) are effective in some cases of acute mania, nymphomania and satyriasis, acting as do the more powerful of the group of solanaceous drugs. It will be observed that the therapeutic uses of dulcamara are closely allied to those of belladonna, minus the profound impression derived from atropine.

Dulcamara should be remembered as a possible remedy in chronic skin diseases of a pustular, vesicular or scaly type, particularly the latter. It may also be tried in pudendal itching

ECHINACEA.

The dried root of *Brauneria angustifolia*, Linné (*Echinacea angustifolia* [DeCandolle], Heller). (Nat. Ord. Compositæ.) In rich prairie soils of western United States, from Illinois westward through Nebraska and southward through Missouri to Texas.

Common Names: Narrow-leaved Purple Coneflower, Purple Coneflower, Coneflower.

Principal Constituents.—Minute traces of an unimportant alkaloid and an acrid body (1/2 to 1 per cent), probably of a resinous character linked with an organic acid. The latter is the chief active principle of the drug.

Preparations.—1. *Specific Medicine Echinacea. Dose*, 1 to 60 drops, the smaller doses being preferred. *Usual method of administration:* ℞. Specific Medicine Echinacea, fl℥j to fl℥ij; Water, q. s. fl℥iv. Mix. Sig.: One teaspoonful every 1 to 3 hours.

2. *Echafolta.* (A preparation of Echinacea freed from extractive and most of the coloring matter. It also contains a small added quantity of tincture of iodine. The label states that is iodized). *Dose*, 1 to 60 drops. Usually administered the same as the specific medicine; except when iodine is contraindicated, or is undesired.

3. *Echafolta Cream.* An ointment for external use.

Specific Indications.—"Bad blood"; to correct fluid depravation, with tendency to sepsis and malignancy, best shown in its power in gangrene, carbuncles, boils, sloughing and phagedenic ulcerations, and the various forms of septicæmia; tendency to formation of multiple cellular abscesses of a semi-active character and with pronounced asthenia; foul discharges with emaciation and great debility; dirty-brownish tongue; jet-black tongue; dusky, bluish or purplish color of the skin or mucous tissues, with a low form of inflammation. It is of special value in typhoid states, in which it is indicated by the prominent typhoid symptoms—dry tongue, sordes on tongue and teeth, mental disturbances, tympanites and diarrhœal discharges—and in malignant carbuncle, pyosalpinx, and thecal abscesses.

Action.—The physiological action of echinacea has never been satisfactorily determined. It has been held to increase phagocytosis and to improve both leukopenia and hyperleucocytosis. That it stimulates and hastens the elimination of waste is certain, and that it possesses some antibacterial power seems more than probable. Upon the mucous tissues echinacea causes a quite persistent disagreeable tingling sensation somewhat allied to, but less severe, than that of prickly ash and aconite. It increases the salivary and the urinary flow, but sometimes under diseased conditions anuria results while it is being administered. In the doses usually given no decided unpleasant symptoms have been produced; and no reliable cases of fatal poisoning in human beings have been recorded from its use. Occasionally bursting headache, joint pains, dry tongue, reduced temperature and gastro-intestinal disturbances with diarrhœa are said to have resulted from large doses of the drug.

Therapy.—*External.* Echinacea is a local antiseptic, stimulant, deodorant, and anæsthetic. Alcoholic preparations applied to denuded surfaces cause considerable burning discomfort, but as soon as the alcohol is evaporated a sense of comfort and lessening of previous pain is experienced. Its deodorant powers are remarkable, especially when applied to foul surfaces, carcinomatous ulcerations, fetid discharges from the ears, and in

gangrene. While not wholly masking the odor of cancer and gangrene it reduces it greatly, much to the comfort of the sick and the attendants. Echinacea is useful as an application where decay is imminent or taking place, reparative power is poor, and the discharges sanious and unhealthy. It is especially valuable in sluggish ulcers, bed sores, stinking tibial ulcers, and ulcers of the nasal mucosa, due either to ozæna or to syphilis. The greater the tendency to lifelessness and dissolution of the tissues and the more pronounced the fetid character of the discharges, the more applicable is echinacea. Used by spray it is effective to remove stench and to stimulate repair in tonsillitis, the angina of scarlatina, and though not alone capable of curing diphtheria, either by external or internal use, it stimulates the near-necrosed tissue to activity and overcomes the fetid odor, thus contributing in a large measure to aid more specific agents. A 10 to 50 per cent solution may be used to cleanse abscess cavities, to apply to ragged wounds from barbed wire, tin, and glass, wounds which for some reason are very painful and heal sluggishly. For this purpose we prefer ℞. Echafolta (or Echinacea), fl℥j; Asepsin, gr. xv; Tincture of Myrrh, fl℥ij; Sterile Water, q. s. fl℥iv. Mix. Apply upon sterile gauze, renewing at reasonable periods. This also makes a good mouth wash for foul breath and to remove odor and stimulate repair in pyorrhœa alveolaris, spongy and bleeding gums, and aphthous and herpetic eruptions. Echinacea is sometimes of value in eczema, with glutinous, sticky exudation, and general body depravity; to give relief to pain and swelling in erysipelas, mammitis, orchitis, and epididymitis; to allay pain and lessen tumefaction in phlegmonous swellings; and to dress syphilitic phagedena. As a local application to chilblains it has done good service, and in poisoning by Rhus Toxicodendron is relied upon by many as one of the best of local medicines. We have found it especially useful in dermatitis venenata after denudation of the cuticle when ulcers form and the neighboring glands swell. Echinacea has a greater record for success than any single medicine for snake bites and insect bites and stings, and it may be used full strength to relieve the intolerable itching of urticaria. Some have asserted that it will abort boils. For the treatment of carbuncle, after thoroughly incising, a 50 per cent solution to full strength echinacea or echafolta may be freely used, syringing the channels with it. This gives great relief from pain and insures a quicker recovery.

For all the above-named purposes either echinacea or echafolta may be used: the latter is usually preferred where a cleanlier appearance is desired. Moreover, in most of the conditions named repair takes place much sooner and in better form if the remedy is given internally concomitantly with its external use.

Internal. Echinacea is stimulant, tonic, depurative, and especially strongly antiseptic; it is in a lesser degree anæsthetic and antiputrefactive. The necessity for remedies that possess a *general antiseptic property* and favor the elimination of caco-plastic material is most marked when one is treating diseases which show a depraved condition of the body and its fluids. Such a remedy for "blood depravation," if we may use that term, is echinacea. No explanation of its action has even been satisfactorily given, and that a simple drug should possess such varied and remarkable

therapeutic forces and not be a poison itself is an enigma still to be solved, and one that must come as a novelty to those whose therapy is that of heroic medicines only If there is any meaning in the term alterative it is expressed in the therapy of echinacea. For this very reason has a most excellent medicine been lauded extravagantly and come near to damnation through the extravagant praises of its admirers.

Echinacea is a remedy for autoinfection, and where the blood stream becomes slowly infected either from within or without the body. Elimination is imperfect, the body tissues become altered, and there is developed within the fluids and tissues septic action with adynamia resulting in boils, carbuncles, cellular tissue inflammations, abscesses, and other septicæmic processes. It is, therefore, a drug indicated by the changes manifested in a disturbed balance of the fluids of the body resulting in tissue alteration: be the cause infectious by organisms, or devitalized morbid accumulations, or alterations in the blood itself. It is pre-eminently useful in the typhoid state, and many physicians administer it regardless of any other indication throughout enteric fever as an intercurrent remedy. Echinacea is especially to be thought of when there are gangrenous tendencies and sloughing of the soft tissues, as well as in glandular ulcerations and ulcers of the skin. It is not by any means a cure-all, but so important is its antiseptic action that we are inclined to rely largely on it as an auxiliary remedy in the more serious varieties of disease—even those showing a decided malignancy—hence its frequent selection in diphtheria, small-pox, scarlet fever, typhoid fever and typhoid pneumonia, cerebro-spinal meningitis, la grippe, uræmia, and the surgical and serpent and insect infections. Foul smelling discharges are deodorized by it and the odor removed from foul smelling ulcers and carcinomata, processes not alone accomplished by its topical use but aided greatly by its internal exhibition. In puerperal fever, cholera infantum, ulcerated sore throat, nasal and other forms of catarrh and in eczema and erysipelas it fulfills important indications for antisepsis.

Echinacea was introduced as a potent remedy for the bites of the rattlesnake and venomous insects. It was used both externally and internally. Within bounds the remedy has retained its reputation in these accidents, it probably having some power to control the virulence of the venom, or to enable the body to resist depression and pass the ordeal successfully; nevertheless fatalities have occurred in spite of its use. For ordinary stings and bites its internal as well as external use is advisable.

In the acute infectious diseases echinacea has rendered great service. Throughout typhoid fever it may be given without special regard to stated periods, but wherever a drink of water is desired by the patient, from 5 to 10 drops of Specific Medicine Echinacea may be given in it. Having no toxic power, and acting as an intestinal antiseptic, this use of it is both rational and effective. Cases apparently go through an invasion of this disease with less complications and less depression when the drug is so employed. The same is true of it in typhoid-pneumonia, septicæmia, and other septic fevers. It has the credit of regulating the general circulation, and particularly that of the meninges in the slow forms of cerebrospinal meningitis, with feeble, slow, or at least not accelerated pulse, temperature scarcely above normal, and cold extremities; with this is headache, a peculiar

periodic flushing of the face and neck, dizziness, and profound prostration (Webster). It is evidently a capillary stimulant of power in this dreaded disease, in which few remedies have any saving effect. Echinacea has aided in the recovery of some cases of puerperal septicæmia. Obviously other measures are also required. In non-malignant diphtheria, echinacea, both locally and internally, has appeared to hasten convalescence, but in the light of present day therapeutics it is folly to expect echinacea to cure the malignant type. A wide experience with the drug in such cases convinces us that we are leaning upon a slender reed when we trust alone to such medicines as echinacea and lobelia in malignant diphtheria. As many non-malignant cases tend to quick recovery, the use of good remedies like echinacea undoubtedly hastens the process. But to assume that it will cure every type of the disease because it succeeds in aiding the milder forms to recover is to bring a good medicine into unmerited discredit. Moreover, when these claims were originally made, and probably in good faith, there was no exact means of establishing the bacterial nature of the disease, hence many tonsillar disorders were called diphtheria. The latter were, of course, benefited by it, for in tonsillitis, particularly the necrotic form with stinking, dirty-looking ulcerations, it is an excellent remedy. Echinacea is said to be a good agent in a malignant form of quinsy known as "black tongue"; and in "mountain fever", closely allied to and often diagnosed as typhoid fever.

Echinacea is justly valued in catarrhal conditions of the nasal and bronchial tracts, and in leucorrhœa, in all of which there is a run-down condition of the system with fetid discharge, and often associated with cutaneous eruptions, especially of an eczematous and strumous type. Chronic catarrhal bronchitis and fetid bronchitis are disorders in which it has been used with benefit, and it is said to ameliorate some of the unpleasant catarrhal complications of pulmonary tuberculosis, and particularly to render easier expectoration in that form known as "grinder's consumption". Patients suffering from common nasal and bronchial catarrhs have been greatly improved by echinacea when taking the drug for other disorders. Its stimulating, supporting and antiseptic properties would make echinacea a rational remedy for such disorders, particularly if debility and general tissue depravity were coexistent with the catarrh.

As a rule echinacea is of little or no value in agues, yet physicians of malarial districts assert it is of benefit in chronic malaria when of an asthenic type. Altogether likely its value, if it has any, lies in the betterment of the asthenia, rather than to any effect it may have upon the protozoal cause of the disease. In so-called typho-malarial fever it does good just in proportion as the typhoid element affects the patient. Both it and quinine would be rational medication.

Echinacea possesses no mean antifermentative power, and by its local anæsthetic effect obtunds pain. When an offensive breath, due to gaseous eructation, and gastric pain are present, it proves a good medicine in fermentative dyspepsia. The symptoms are aggravated upon taking food. It is also serviceable in intestinal indigestion with pain and debility and unusually foul flatus, and has been recommended in duodenal catarrh. We can see no reason why it should not have some salutary effect in both

gastric and duodenal ulcer, for it antagonizes putrefaction, tissue solution, and pain. In ulcerative stomatitis and nursing sore mouth, in both of which it is very effectual, it should be used both internally and locally. When dysentery, diarrhœa, and cholera infantum occur in the debilitated and the excretions are more than commonly foul, both in odor and shreds of tissue, echinacea is a serviceable adjunct to other treatment.

The dose of either specific medicine echinacea or echafolta ranges from 1 to 5 drops; larger doses (even 60 drops) may be employed, but small doses are generally most efficient if frequently repeated. They may be given in water or syrup, or a mixture of water and glycerin, as: ℞ Specific Medicine Echinacea, fℨj to fℨij; Water, q. s., fℨiv. Mix. Sig.: Teaspoonful every 1/2 or 1 hour in acute cases; every 3 or 4 hours in chronic affections. If these preparations are to be dispensed in hot weather, or are to be used in fermentative gastro-intestinal disorders, the substitution of 1/2 ounce of pure glycerin for 1 fluidounce of the water is advisable.

☞ *Echafolta* (now iodized) should be given internally only when iodine is not contraindicated, or is desirable. Formerly, before being iodized, it was used internally in the same manner and for the same purposes as Echinacea. The Echafolta should be reserved for external use.

Echafolta Cream is an admirable form in which to use Echafolta, where an ointment is desired, being a useful unguent in the various skin disorders in which Echafolta or Echinacea is indicated.

ELATERIUM.

The feculence of the juice of the fruit of *Ecballium Elaterium* (Linné), A. Richard. (Nat. Ord. Cucurbitaceæ.) A trailing vine of southern Europe.

Common Names (of fruit): Squirting Cucumber, Wild Cucumber, Wild Balsam Apple.

Description.—Light, brittle, flat flakes, pale-gray with a greenish or yellowish tinge, a tea-like odor, and an intensely bitter taste.

Principal Constituent.—The neutral purgative principle *elaterin* ($C_{20}H_{28}O_6$) present to the extent of 20 to 25 per cent.

Preparation.—*Specific Medicine Elaterium. Dose*, 1 to 20 drops.

Derivative.—*Elaterinum*, Elaterin. (Odorless, very bitter, and slightly acrid, white scales or crystals; permanent in the air. Very soluble in chloroform; sparingly in alcohol, and almost insoluble in water.) *Dose*, 1/40 to 1/8 grain. Of the *Trituratio Elaterini* (elaterin, 1; sugar of milk, 9), 1/4 to 1/2 grain.

Specific Indications.—Chronic cystitis with pain in the neck of bladder, the urine passes in a torrent, and after micturition there is violent cramp-like aching extending from the bladder into the pelvis and thighs; deep soreness or tenderness in the bladder, perineum, or throughout the pelvis, with tenesmic voiding of mucus or muco-pus-laden urine; dropsies of plethora; cerebral congestion; pulmonary œdema.

Action and Therapy.—Elaterium is the most powerful and the best of the hydragogue cathartics. As such it is indicated only in individuals strong enough to stand depletion, and is always contraindicated in the weak and feeble. Overdoses—even a few grains—may produce a diffuse gastro-enteritis, with violent vomiting, cramps, and watery purgation. In medium doses only copious watery stools are produced, but with considerable depression. The treatment for excessive action of elaterium is that for gastro-enteritis in general.

In medium doses elaterium has been, and is still to a lesser extent, used as a dehydrating cathartic in chronic dropsies of hepatic or abdominal origin, and in chronic nephritis. When the liver is involved, with congestion or torpor, it may be given with podophyllin; if there are heart complications, with digitalis. It is quite certain to reduce the ascites; but when the latter is dependent on destruction of tissue, it does not, of course, cure the disease, of which the dropsy is but a symptom. It is often useful in dropsy after scarlet fever, if the patient is not greatly exhausted; and it is more especially indicated when uræmic convulsions threaten or are present. Elaterium is a useful purgative when a revulsive is needed in cerebral congestion.

The small dose of elaterium is preferred for other specific purposes. Elaterium is *the* remedy for chronic inflammation of the bladder, as first announced by King. When indicated the urine rushes from the urethra as in a torrent and is accompanied by constant pain radiating from the neck of the bladder to the surrounding tissues, and micturition is followed by violent pelvic and femoral cramps. This condition is frequently associated with general pelvic dragging and tenderness, and the urine is characteristic of chronic subacute inflammation—ropy with mucus or muco-pus. The dose should be small enough not to provoke emesis or catharsis. The usual prescription is: ℞ Specific Medicine Elaterium, gtt. x to xx; Water, q. s., fl℥iv. Mix. Sig.: One teaspoonful 3 or 4 times a day.

For hydragogue purposes *Elaterin* is preferred by some physicians, though elaterium, notwithstanding its impurities, seems to be more generally efficient than its derivative.

EPIGÆA.

The leaves of *Epigæa repens*, Linné (Nat. Ord. Ericaceæ). A small, trailing, shrubby plant of the eastern half of the United States. *Dose*, 5 to 60 grains.

Common Names: Trailing Arbutus, Gravel Weed, Gravel Plant, Ground Laurel, Mayflower.

Principal Constituents.—The glucosides *arbutin* ($C_{12}H_{16}O_7$), *urson* ($C_{30}H_{52}O_2$), and *ericolin* ($C_{26}H_{30}O_3$); and tannin.

Preparation.—*Specific Medicine Epigæa. Dose*, 5 to 60 drops.

Specific Indications.—Uric and lithic acid deposits; debilitated and relaxed bladder, with mucus in the urine; irritable vesical membrane; voiding of urine containing blood or muco-pus.

Action and Therapy.—Trailing arbutus is a useful diuretic when the urine is loaded with deposits of red, sandy material, mucus or muco-pus. It renders the urine less irritating, and is valuable to relieve irritation of the mucous membranes, vesical tenesmus, dysuria, and strangury. The urine is of higher than normal gravity and may contain, besides deposited salts, lithic acid gravel and broken down blood. It is especially useful where the bladder wall becomes dense and irritated and the condition easily lapses into a chronic muco-purulent cystitis. The specific medicine or the fluidextract may be given in hot water.

Trailing arbutus is one of the plants fast disappearing from our flora, owing to its reckless gathering by wood-despoiling vandals. Thus a beautiful wild flower, as well as a good medicine, is threatened with extermination.

EPILOBIUM.

The leaves and tops of *Epilobium angustifolium*, Linné, and *Epilobium palustre*, Linné (Nat. Ord. Onagraceæ). North America. *Dose*, 10 to 60 grains.

Common Names: 1. Willow Herb, Great Willow Herb, Rose Bay, Wickup. 2. Wickop, Swamp Willow Herb, Marsh Epilobium.

Principal Constituents.—The plants have not been satisfactorily examined.

Preparations.—1. *Infusum Epilobii*, Infusion of Epilobium (℥j to water, Oj). *Dose*, 2 fluidrachms to 1 fluidounce.

2. *Specific Medicine Epilobium. Dose*, 10 to 60 drops.

Specific Indications.—"Diarrhœa with colicky pain; feculent discharges with tenesmus; diarrhœa with contracted abdomen; chronic diarrhœa with harsh, dirty-looking, contracted skin"; diarrhœa of typhoid fever; typhoid dysentery.

Action and Therapy.—Epilobium is a remedy for the diarrhœa of debility and irritability of the intestinal mucosa. It is the most certain and kindly remedy we have ever used to control the diarrhœa of typhoid fever; and the experience covers a period of years. The diarrhœa does not entirely cease, but becomes reduced to fewer movements and of an increased consistence.

It has long been recognized as a valuable agent in "camp or army diarrhœa"; and in domestic practice it is in common use in some parts of the country to check the summer diarrhœas of young children—muco-enteritis, enterocolitis, gastro-enteritis, and cholera infantum. The experience of physicians justifies these claims. The indication is greenish discharges of half-digested food and mucus. It is equally useful in chronic dysentery and in that of a typhoid type. In most cases of intestinal irritation it acts well, and is indicated by a slick, contracted tongue with nearly effaced papillæ and pinched emaciated features. It is also of service in impaired digestion with uneasy sensations in the abdomen, sometimes amounting to pain and even colic, and accompanied by a persistent diarrhœa. The infusion is the best preparation. It may be prepared in the usual way, and aromatized with essence of peppermint and preserved with a small quantity of glycerin.

EPINEPHRINA.

Adrenalin, Epinephrin(e), Suprarenin.

The blood-pressure-raising, active principle of dried suprarenal glands of the sheep and other animals (*suprarenalum siccum*). (Formula of Hydrated Epinephrine, $C_9H_{13}O_3N + 1/2\ H_2O$.)

Description.—An odorless, feebly bitter, fine, white or yellowish crystalline powder. Owing to its scanty solubility in water it is usually marketed in 1 to 1000 solution. It must be carefully kept, as it oxidizes readily, and dilute alkaline solutions destroy it.

Preparations.—*Adrenalin Chloride* in 1 to 1000 solution. *Dose*, 5 to 15 minims of the solution. Sometimes lesser solutions up to 1 to 10000 are used, when the dose will correspond. When aqueous solutions are wanted one of its salts is prescribed; when an oily preparation is employed the base is used.

[*Suprarenalum Siccum*, Dried or Dessicated Suprarenals, from which the epinephrine (adrenalin) is extracted, are the cleaned, fat free, dried suparenal glands of animals, and for medicinal use occur as a light, noncrystalline, yellowish-brown powder, soluble partially in water. *Dose*, from 2 to 8 grains; the average dose, 4 grains].

Action.—The dried suprarenal gland, chiefly through the active principle, adrenalin (epinephrine), is a powerful angio-stenotic. The latter body is the most powerful known astringent and hemostatic, besides being

a most energetic stimulant to the heart. Either the gland or the adrenalin, which is now chiefly used, when applied to mucous surfaces acts at once upon the muscular coats of the capillaries, causing extreme constriction or ischæmia, so that the tissues immediately become blanched and practically bloodless. As a rule, this is not followed by such pronounced relaxation and congestion as takes place after the similar application of cocaine, though it does sometimes occur. Though adrenalin does not relieve pain, it prolongs the obtunding effects of cocaine by limiting its action to the part to which it is applied by constricting the surrounding vessels. Hypodermatically used it increases the tone of the whole muscular system, probably by stimulation of the sympathetic nerve endings in the muscles. The splanchnic blood supply is constricted by it probably through both centric and peripheral vaso-motor control. Blood pressure is raised enormously, but briefly and immediately, and the pulse is slowed by it. Owing to the fact that vessel contraction and heart stimulation do not occur simultaneously, the latter being delayed, cardiac paralysis with dilatation may occur; fatal issues have been attributed to this incoördinate action. The vessels of the lungs are said not to be affected by adrenalin, nor unless locally applied is the action upon the veins of the body important. Increased urination from high blood pressure is caused by it, and the uterine muscles and vessels are contracted. While the blood vessels of the brain appear to be affected but little by it, increased blood pressure in the general circulation makes it dangerous where atheroma or arteriosclerosis exists lest a cerebral hemorrhage from rupture be produced. Unpleasant results have also followed the local use of adrenalin, probably due to its depressing effect upon protoplasm and the prolonged vascular relaxation sometimes following its first constricting effects. When these occur hemorrhage may come on, or sloughing take place at the place of injection. Death has followed the use of adrenalin, being caused either by acute dilation of the heart, or centric paralysis of respiration.

Therapy.—*External.* Adrenalin is used largely for its constricting effects in small local hemorrhages, and in minor surgical operations. By limiting the circulation it prolongs the anæsthesia of cocaine and procaine, and prevents their general absorption and consequent poisoning of the nervous system. It is very largely used to render operations practically bloodless, especially those of the nose and throat and ears. For local constriction and limitation it is combined with local anæsthetics in visceral operations to prolong anæsthesia and prevent bleeding at the abdominal incision. Applied locally to the mucous membranes it reduces engorgement of the turbinates and of congestive conjunctivitis, but its use may be followed by reactive congestion worse than the original swelling. It gives temporary relief from the distressing sneezing and coryzal discharges of hay fever. For the latter purpose an oily spray (1 to 10000) is preferred.

Internal. Adrenalin and dried suprarenals should not be given by mouth, as they are readily decomposed in the stomach, and probably prevent their own absorption by their rapidly constringing local action. Neither should the suprarenals be used subcutaneously for fear of septic poisoning, as they readily become putrid. Only the adrenalin preserved in solution (it is not stable when dry) should be used hypodermatically.

Adrenalin is to be employed whenever sudden circulatory collapse occurs from any cause, and particularly in that taking place during operations, or when shock threatens. It should then be administered with normal salt solution. It is also invaluable when sudden relaxation threatens or occurs from chloroform anæsthesia. Indeed, for surgical shock and chloroform collapse it is the most important agent now in use to overcome the vascular relaxation, and should then always be given with the saline solution. Its intravenous use is looked upon with suspicion on account of the cardiac and pulmonic accidents that may follow, or rupture of the cerebral vessels from the profoundly intimate action.

Adrenalin (10 minims of 1 to 1000 solution) has been advised to cut short attacks of bronchial asthma, and it is also advised in opium and morphine poisoning. We would advise that it be retained for use in surgery only, and that a solution of the adrenalin and an isotonic salt solution be prepared beforehand to be ready for mixture in case of emergency.

EQUISETUM.

The plant, *Equisetum hyemale*, Linné (Nat. Ord. Equisetaceæ). A peculiar leafless plant found throughout the northern and western parts of the United States in damp and wet situations. *Dose*, 5 to 60 grains.

Common Names: Scouring Rush, Horse Tail, Shave Grass.

Principal Constituents.—A large amount of silica, a soft green resin, and *equisetic acid* (aconitic acid).

Preparation.—1. *Specific Medicine Equisetum.* *Dose*, 5 to 60 drops.
2. *Infusum Equiseti.* Infusion of Equisetum. *Dose*, 1 to 2 fluidounces.

Specific Indications.—Cystic irritation; tenesmic urging to urinate; nocturnal urinal incontinence; renal calculi.

Action and Therapy.—Equisetum is diuretic and astringent. It is asserted to greatly relieve irritation due to the presence of gravel and the tenesmic urging to urinate in acute inflammations of the genito-renal tract. When the bladder becomes so irritable that the patient, upon dropping to sleep, loses control over the urine it is said to be specially serviceable. It has restrained hematuria and is of service in acute prostatitis and in the prostatorrhœa which follows it. The infusion (℥j to Water, Oj) is the preferred preparation.

ERECHTITES.

The entire plant and oil of *Erechtites hieracifolia*, Rafinesque (Nat. Ord. Compositæ). A rank weed throughout the United States.

Common Name: Fireweed.

Principal Constituent.—A volatile oil (*Oleum Erechtitis*).

Preparation.—*Oleum Erechtitis*, Oil of Fireweed. *Dose*, 5 to 10 drops.

Specific Indications.—Catarrhal states and passive hemorrhages; "albuminurea, dropsy, pale waxy skin, swelling of the feet, scanty urine" (Watkins).

Action and Therapy.—True oil of fireweed (much that is sold is oil of fleabane) improves the appetite and digestion, stimulates the functions of the gastro-intestinal glands and pancreas, and causes free and full alvine evacuations, rendering it useful in chronic constipation, especially when acid fermentation and flatulence are present. Its ultimate effect upon the circulation is to raise vascular tension. It is eliminated most largely by the

lungs, and to a lesser extent by the kidneys and skin. The class of disorders it benefits are those attacking the bronchial and renal mucosa, it being effective in relieving chronic bronchitis, pulmonic catarrhs with cough, and genito-urinary catarrh, pyelitis, and cystitis. It has been suggested in chronic nephritis, with pale, waxy skin and pedal œdema. For this purpose the dose should not be over one drop of the oil, in emulsion well diluted. Usually the oil is administered on sugar.

ERGOTA.

The sclerotium of *Claviceps purpurea* (Fries), Tulasne (Class Fungi), replacing the grain of rye (*Secale cereale*, Linné; Nat. Ord. Graminaceæ). It should be carefully dried and kept in close containers with a few drops of chloroform or of carbon tetrachloride to protect it from the ravages of insects. Europe, chiefly from Spain and Russia.

Common Names: Ergot, Ergot of Rye, Spurred Rye, Spur, Smut Rye.

Description.—Purplish-black or brownish-black curved and tapered cylindraceous bodies, obscurely angled and furrowed and breaking with a short fracture, exhibiting a pinkish, reddish-white, or grayish-white interior. To the taste it is disagreeably oily, and has a peculiar, somewhat fish-like odor. *Dose*, 5 to 60 grains.

Principal Constituents.—Until recently the chemistry of ergot seems to have been almost hopelessly confused. It is now known to contain several alkaloids, the chief of which, in point of activity, is *ergotoxine* ($C_{35}H_{41}O_6N_5$), believed to be the hydrate of the inactive *ergotinine* ($C_{35}N_{39}O_5N_5$). *Ergamine* (histamine) is another energetic constituent, while *tyramine*, though powerful, is less active than the latter. To these alkaloids is attributed the action of ergot. Ergotine, ecboline, cornutine, sphacelinic acid, sphacelotoxine, secalotoxine, chrysotoxine, and other bodies once thought to be important, may, in the light of present chemical conceptions of the constituents of ergot, be practically ignored.

Preparations.—1. *Specific Medicine Ergot. Dose*, 1 to 60 drops; for hemorrhage and in labor, full doses.

2. *Lloyd's Ergot* (for hypodermatic use). *Dose*, 5 to 60 drops. In hemorrhage and in labor, full doses.

Specific Indications.—Active hemorrhage; post-partum hemorrhage (full doses); uterine inertia; congestion or hyperæmia of any part; venous fullness; mental apathy; dullness, hebetude, and tendency to coma; feeble circulation, cold surface, pallor, and dilated (sometimes contracted) pupils; fullness and uneasiness of genitalia, with or without œdema; hemiplegia and paraplegia, with hyperæmia or congestion; congestive headache; hyperæmic or congestive eye and ear disorders; slight otorrhœa with turgid drum-head.

Action.—Unless administered in toxic amounts ergot has no appreciable effect on the general nervous system, except to stimulate the vaso-motor center of the medulla and the uterine centers of the hypogastric plexus of the spinal cord. It has, however, an important controlling power over the circulation through its dominant action—that of stimulation of the circular fibers of non-striated muscle. It is thought to have less action upon the heart, as that is a specialized form of muscle differing materially from that of the vessels. Wood declared that the heart is distinctly depressed by the direct contact of the drug when reaching that organ. The general consensus of opinion, however, inclines to the belief that the heart is affected chiefly by the back pressure exerted by the constricting action of the drug upon the arterioles. The effects of ergot appear to be greatest upon the smaller parts of the vessels. Ergot has practically no effect upon the voluntary or striated muscle fibers.

The first effect of ergot upon the circulation is to lower blood pressure. Then by its vaso-constricting power it raises arterial tension. This action is thought to be due to a slight stimulation of the vaso-motor centers, but much more completely to its direct power over unstriped muscular fiber. In fact, the one great over-shadowing power of ergot is this vaso-constriction of involuntary musculature which is exhibited in its action upon two groups of organs, viz.: the circulatory vessels and the hollow viscera. This gives to ergot its great power to control hemorrhage, and its propulsive force in labor. Ergot acts to a limited extent upon the non-gravid uterus, much more powerfully upon the gravid womb, and with great force when in parturient action. This is believed to be due most largely to its direct action upon the uterine musculature, but aided to some extent by stimulation of the hypogastric plexus and the terminals of the hypogastric nerves at the uterine myo-neural junction. Though ergot is said to fail to initiate uterine contraction in the very early months of fetal life, and is therefore incapable of inducing abortion, the facility with which this crime is committed with ergot alone seems to controvert this stand. It is perhaps more difficult to produce its effects in this way than when mechanical interference has first been resorted to. Upon the stomach ergot acts as an irritant and often produces nausea and vomiting. While peristalsis is increased by ergot, the secretions of the skin, kidneys, salivary and mammary glands are decreased by ergot.

Though ergot is said to have but little effect upon the general nervous system, it is known to produce a peculiar form of chronic poisoning of a spasmodic or convulsive type, and another, probably due to emboli, of a gangrenous character.

Toxicology.—Ergot produces both acute and chronic poisoning. In *Acute Ergot Poisoning* there is nausea and vomiting, severe thirst, violent headache, slow, followed by rapid pulse, coldness of the surface, stupor and purpuric blotches. These cases are almost invariably the result of its use by women as an abortifacient. The main treatment is that of acute gastro-enteritis. To sustain the circulation, cardiac stimulants as caffeine, coffee, or amyl nitrite may be administered and heat applied to the body. Single large doses of ergot seldom kill; fatal results come only after long continued use of small doses.

Chronic Ergotism assumes two forms: the pathologic features of which do not differ greatly in some respects except in their terminations. It is common among the peasantry of Europe, who subsist on rye bread. The disease is thought to be due to contamination of the latter with ergotized grain.

Spasmodic or *Convulsive Ergotism* develops successively with weariness, inordinate hunger, vomiting, and diarrhœa, headache, formication, numbness, mental torpor, drowsiness, dimness of sight, headache, tinnitus aurium, tonic and tetanic muscular contractions, and ends in convulsions. Sometimes it terminates in insanity and death.

Gangrenous Ergotism is marked by exhaustion, voracious appetite, dilated pupils, dimness of vision, formication, cyanosis, muscular contraction, and aching. It terminates in moist or dry gangrene of various parts of the body, but most frequently of the fingers and toes. This form is often fatal and is sometimes accompanied by cataract.

Therapy.—*External.* Lloyd's ergot (non-alcoholic) is an exceedingly good constringing drug in conjuctival congestion, keratitis, follicular conjunctivitis, incipient trachoma, and other conjunctival disorders with great vascularization. From 15 to 30 drops are added to 1 fluidounce of sterile water and instilled. It is also sometimes used by insufflation with boric acid (℥j to fl℥j), in purulent otitis media, with little discharge and a turgid tympanic membrane. Care should be had not to occlude the aural passage and thus prevent drainage. Fluid preparations of ergot applied to incipient boils sometimes abort them, and in acne seborrhœa, acne rosacea, and urticaria they have some ameliorating effect. Hemorrhoidal bleeding may be controlled by suppositories containing ergot, and powdered ergot sprinkled upon bleeding cancerous ulcerations has effectually controlled the seepage.

Internal. Ergot was formerly very extensively employed in obstetrical practice to effect the rapid and forcible delivery of the child. As the uterine contractions produced by ergot are totally unlike the smooth, regular and intermittent action of those of normal labor, the drug proved a vicious and damaging medicine. Its vise-like compression frequently caused the death of the child by asphyxia, or rupture of the womb, or retention of the secondines, with subsequent sepsis. The contractions induced by ergot are violently tonic and tetanic, with scarcely an interval of repose, and never relaxing until the child is expelled or an accident occurs. They also continue for some time after the expulsion of the child, with the result of sometimes causing hour-glass contraction or otherwise imprisoning the placenta. It took many years for physicians to discover that in their heroic use of ergot they were fighting directly against nature. Proviso was always observed, however, that the os was sufficiently dilated, the presentation correct, and that there existed no disparity between the size of the fetal head and the pelvic outlet. Still the results were often bad and ergot continued in its trail of tragedy.

Present-day obstetricians have but one indication for the use of ergot in obstetrics—threatened or alarming hemorrhage. They contend, and rightly, that the womb should be absolutely empty of child and placenta before ergot should be administered. As alarming hemorrhages, except in placenta prævia, are nearly always post-partum, ergot is then perfectly safe and the best agent that can be administered. There are some, however, who still contend for the use of ergot when hemorrhage occurs or is threatened before the child is fully born. They do not use it until the head is extruded, and marked uterine inertia is evident. Even in such cases, while it contracts the vessels and the womb, it is liable to trap the secundines, and prompt use of the forceps and manual cleansing of the uterine cavity would appear to be the more rational procedure, ergot being given as soon as the placenta is removed. In the hands of a competent manipulator forceps are incomparably safer than ergot. If hemorrhage occurs after the uterus is completely emptied, a full dose of Lloyd's or other good preparation of ergot should be given hypodermatically, the womb manipulated by the Credè method, and other indicated measures employed.

The routine custom of giving a dose of ergot after every case of parturition, even when the womb is completely empty, for the purpose of

forestalling a possible hemorrhage, and in the absence of uterine inertia, is to be condemned. Increased after-pain is in itself a protest against the indiscriminate use of a remedy so productive of harm as ergot. Ergot should never be administered on suspicion, but only when there is present or impending complications demanding its exhibition.

Ergot has been given, with only fair results, to promote the absorption or expulsion of polypi, and submucous uterine fibromata. Only very small neoplasms are thus affected, and then never when they are located outside the uterine body, or subperitoneally. For uterine subinvolution, however, ergot is one of the best and promptest of remedies, and is more especially indicated if there is also passive bleeding.

Ergot contracts the sphincters, notably that of the bladder. Large doses will so strongly affect the latter that retention of urine occurs. In ordinary doses, however, it may be given with good results in incontinence of urine and other bladder affections with relaxation or weakness of sphincter control. From 10 to 15 drops of the specific medicine may be given in water and repeated as needed, or the following prescription by Locke may be administered. ℞ Specific Medicine Ergot, fl ʒ ss; Specific Medicine Barosma, fl ʒ j; Simple Syrup, fl ʒ ijss. Mix. Sig.: One teaspoonful every 4 hours. When cystic paralysis is due to overdistention of the bladder ergot frequently restores the power of the organ to contract.

Amenorrhœa is sometimes cured by ergot. The cases in which it does good display relaxed tissue and congestion; under similar circumstances it frequently aids in leucorrhœa. Spermatorrhœa, with turgescence of the erectile tissue, is sometimes bettered by small doses of ergot, though it frequently fails.

Ergot is used largely for other than post-partum forms of hemorrhage. It is least valuable, perhaps, in hemoptysis, for vaso-contriction cannot well take place because the bronchial arteries are composed most largely of elastic in place of nonstriated muscular tissue and there are practically no vaso-motor nerves to control the pulmonic arterioles. Experience bears out this anatomical barrier to successful hemostatic control by vaso-constrictors like ergot. Nevertheless ergot is generally given in pulmonary hemorrhages, but usually in combination with other agents, which probably obscure its inefficiency. A favorite prescription with us in passive hemoptysis contains ergot selected, perhaps, with the hope that it may have some unexplained influence; at least the combination has been exceedingly efficient. ℞ Specific Medicine Ergot (or Lloyd's Ergot), fl ʒ ij; Specific Medicine Cinnamon; Specific Medicine Lycopus, aa fl ʒ ss. Mix. Sig.: Twenty (20) drops in water every half hour until relieved. Locke advised the following: ℞ Specific Medicine Ergot, gtt. x; Ipecac, gr. ss; Gallic Acid, gr. ij. Mix. Sig.: Give at one dose and repeat as needed. He advised the same for the hemorrhage of typhoid fever and in post-partum hemorrhage. In hematemesis ergot should be given preferably by hypodermatic injection, as it is more likely to increase the bleeding by inducing vomiting if given by mouth. Ergot is sometimes useful in epistaxis and in hematuria, though in all other forms of hemorrhages it is far less certain than in uterine hemorrhage.

Ergot is of very great efficiency in metrorrhagia, in congestive menorrhagia, and in excessive menstruation when shreds of membrane are passed. Dysentery with passages of blood is benefited by small doses of the drug. In purpura hemorrhagica and in hemophilia ergot often fails to act, probably because the fault is in the blood rather than the vessels. It is certainly of less value in these disorders than hydrastis and geranium. Ergot has been given for its contractile power over blood vessels to reduce the size of small aneurisms, which it sometimes does; it is most useful in small aneurismal sacculations of the cerebral vessels. Occasionally its external employment, combined with its local effects, controls the bleeding of and relieves hemorrhoids.

Ergot is a valuable remedy in nervous affections when prescribed for those of a hyperæmic or congestive character. It is always contraindicated by anemia. In congestive headache it is especially effective. For migraine it is useful where there are suffused eyes, flushed face, and full pulse. In fact, the indications for vascular disturbances in nervous diseases are very similar to those for belladonna and the results are very much the same. Ergot may be given to advantage where there is "enfeebled capillary circulation with tendency to congestion, especially of the nerve centers." The direct indications are dull, full eyes, with dilated pupils, fullness of the veins, slow pulse, sighing respiration and tendency to coma. Following these guides it is one of the few remedies upon which hope of relief may be based in epidemic cerebro-spinal meningitis. It is especially helpful in acute myelitis, in spinal congestion, in cerebral hyperæmia from any cause, and in paraplegia, with the characteristic vascular sluggishness. In mental disorders ergot frequently benefits—especially in acute, and even in chronic mania, with lucid intervals. Some of these disorders depend upon minute aneurismal sacculations in the cerebral vessels. Such are more apt to be relieved than other forms of maniacal excitement. When any mental aberration depends upon intracranial congestion or obstruction, with bleeding from the nose, dizziness and hebetude, or headache, and tinnitus, due to intracranial miliary aneurisms, ergot renders most efficient service.

Owing to the great variations in ergot, according to its age and manner of keeping, the drug frequently disappoints. For this reason only good, fresh ergot or preparations of it prepared by reliable firms should be used. Preferably it should be standardized, as most of its uses are in accordance with its known physiologic power of contracting unstriped muscular fiber. No one of the constituent principles abstracted from ergot fully and satisfactorily represents the drug, though the so-called *ergotins*, all varying more or less, come the nearest to duplicating the action of the ergot itself.

ERIGERON.

The whole plant of *Erigeron canadense*, Linné (Nat. Ord. Compositæ). A common and troublesome weed through the northern and central parts of the United States.

Common Names: Canada Fleabane, Colt's Tail, Pride Weed, Scabious.

Principal Constituents.—A volatile oil (*Oleum Erigerontis*), and tannic and gallic acids.

Preparations.—1. *Specific Medicine Erigeron. Dose*, 1 to 60 drops.
2. *Oleum Erigerontis*, Oil of Erigeron. *Dose*, 5 to 30 minims, on sugar.

Specific Indications.—(Oil) capillary or passive hemorrhages—hematuria, hemoptysis, epistaxis, hematemesis, and metrorrhagia; "pain-

ful diseases of the kidneys and bladder, and in diseases of the mucous membranes attended by free discharges" (Scudder). Infusion, choleraic discharges, sudden, gushing, and watery, attended with thirst and cramping pain, and sometimes streaked with blood.

Action and Therapy.—Erigeron restrains excessive bowel and kidney discharges. An infusion is a deservedly popular remedy for profuse summer diarrhœas of infants, especially that of cholera infantum and gastro-enteritis. It is indicated by the suddenly gushing and copious evacuations, with cramps, or with but little pain, but often with the presence of slight amounts of blood. The infusion is better than alcoholic preparations for these purposes; besides it supplies water to take the place of the natural fluids so greatly depleted by the discharges. It is also useful in dysentery with passages of mucus and blood. As a remedy for slight hemorrhages, as from the bowels and kidneys, it is rather weak, but sometimes effectual; the oil is a much surer acting hemostatic. Both may be used as a diuretic in gravelly conditions as well as in chronic nephritis, when the urine is tinged with blood, or even where passive hemorrhage is present. It has restrained the pathologic flow of urine in polyuria, or so-called diabetes insipidus.

The oil of erigeron is a good internal hemostatic. It sometimes checks quite severe uterine hemorrhages, and for very small oozings of blood it is one of the very best agents to control the flow. It is also indicated in epistaxis and moderate bleeding from the stomach, bowels, and kidneys. Given in syrup it is useful as a cough medicine when there is bloody expectoration.

ERIODICTYON.

The dried leaves of *Eriodictyon californicum* (Hooker and Arnott), Greene (Nat. Ord. Hydrophyllaceæ). A shrubby plant of California and northern Mexico. *Dose*, 5 to 30 grains.

Common Names: Yerba Santa, Mountain Balm.

Principal Constituents.—Resin, volatile oil, the glucoside *ericolin*, and *eriodictyonic acid*.

Preparation.—*Specific Medicine Yerba Santa. Dose*, 5 to 30 drops.

Specific Indications.—"Cough with abundant and easy expectoration" (Scudder). "Chronic asthma with cough, profuse expectoration, thickening of the bronchial membrane, loss of appetite, impaired digestion, emaciation" (Watkins).

Action and Therapy.—A stimulating expectorant having a kindly and beneficial action upon digestion. It is to be employed where there are excessive catarrhal discharges of the bronchial and renal tracts. It may be used where there is chronic cough with free secretions, as in chronic bronchitis, bronchorrhœa, humid asthma, and the cough of phthisis. Some cases of chronic catarrh of the stomach and catarrhal cystitis have been successfully treated with it.

ERYNGIUM.

The rhizome of *Eryngium yuccæfolium*, Michaux (Nat. Ord. Umbelliferæ). A swamp and wet prairie plant found from Virginia to Texas. *Dose*, 10 to 40 grains.

Common Names: Eryngo, Water Eryngo, Button Snakeroot, Rattlesnake's Master, Corn Snakeroot.

Principal Constituents.—(Has not been analyzed.)

Preparation.—*Specific Medicine Eryngium. Dose*, 5 to 40 drops.

Specific Indications.—Burning pain, with renal, vesical or urethral irritability; painful micturition, with frequent urging to urinate; frequent, scanty and scalding urination; scanty urine, with frequent and ineffectual attempts to urinate; deep-seated pain in bladder extending into the loins; profuse mucous discharges.

Action and Therapy.—The root of eryngium, when chewed, causes a profuse flow of saliva; in large doses it is emetic. Its chief properties are those of a diuretic and expectorant. While of considerable value in chronic laryngitis and bronchitis with free and abundant secretion of muco-pus, it is of most service in irritation of the bladder and urethra, with itching, burning, and constant urging to urinate. It is also useful in dysuria with tenesmus. For that condition in women during or following menstruation, or during the menopause, when sudden chilling throws the burden of excretion upon the kidneys, it is invaluable to control the bladder symptoms—as fullness, burning, itching, frequent attempts at urination, or when every movement of the body is accompanied by the involuntary passing of urine. We know of no remedy that acts so promptly and satisfactorily in such conditions. In the male it relieves uneasy sensations, with burning and itching throughout the vesical, prostatic, and urethral tracts, especially when following gonorrhœa or gleet. It is not contraindicated by inflammation and is of great value in acute cystitis, with deep-seated, burning pain, and where normal secretion is scanty and pathologic catarrh is more abundant. It acts well with apis or gelsemium, with the latter especially when there is a hyperæmic state of the bladder. It relieves the burning pain of urination in gonorrhœa. It is indicated to relieve the difficulties of voiding urine from the presence of gravel and of chronic nephritis; and it restrains the excessive discharges of chronic cystitis. When spermatorrhœa is provoked by urethral irritation, eryngium serves to limit the frequency of losses.

Sometimes eryngium will be found useful in digestive disorders, with persistent gastric irritation and mucous diarrhœa. In these cases the tongue is red and tender, nausea is marked, and there is a strong disgust for food.

EUCALYPTUS.

The leaves of *Eucalyptus Globulus*, Labillardière. Collected from the older parts of the tree. (Nat. Ord. Myrtaceæ.) A native tree of Australia; cultivated elsewhere.

Common Name: Blue Gum Leaves.

Principal Constituents.—A volatile oil (*Oleum Eucalypti*) composed largely of *eucalyptol* (cineol) ($C_{10}H_{18}O$), and a resin.

Preparations.—1. *Oleum Eucalypti*, Oil of Eucalyptus (contains a large proportion, not less than 70 per cent, of eucalyptol). It is colorless or pale yellow, aromatic and pungent, and has a spicy, cooling taste. *Dose*, 1 to 10 drops.

2. *Eucalyptol*, a neutral body derived from the oil. It is a colorless, spicy, aromatic fluid, with a cooling taste. *Dose*, 1 to 10 drops.

3. *Specific Medicine Eucalyptus. Dose*, 5 to 30 drops.

Specific Indications.—Cold extremities and cold perspiration; perspiration during chill; sense of coldness and weight in the intestines; chronic mucous or muco-purulent discharges; pus in the urine; pasty, bad-smelling tongue; fetid excretions; fetid sore throat; fetid catarrhal states of the broncho-pulmonary tract; chronic ague with exhaustive discharges.

Action.—Eucalyptus, and its oil and derivative, are gentle stimulants when given in small doses. Large doses are irritant and may cause gastro-intestinal inflammation and renal congestion. Muscular prostration occurs from overdoses. Blood pressure is lowered by full doses. All the secretions are stimulated when these agents are given in medicinal amounts. All preparations of Eucalyptus are considered antiperiodic and the planting of groves and trees in miasmatic swamps and low grounds is thought to render the air free from malarial miasm. The probabilities are that the enormous quantities of water absorbed by these trees does good by drying the swamps and thus making them poor breeding places for malaria-bearing insects. It is said that a part of the deadly Roman Campagna has been rendered habitable by the introduction of Eucalyptus groves.

Therapy.—*External.* Eucalyptus preparations are antiseptic and disinfectant. They may be sprinkled or sprayed upon offensive material and used to disinfect and deodorize the sick room. They also may form an ingredient of antiseptic poultices and ointments. Dropped upon hot water, or used in suitable oil dilution in sprays, they are useful as throat and pulmonary antiseptics and stimulants. Eucalyptol is especially much employed in subacute inflammations and chronic diseases of the broncho-pulmonic tract, with fetor, relaxation and abundant secretions. Used upon cancerous surfaces they mask the fetid odor and give some relief from pain. The following is an ideal vaginal wash for offensive leucorrhœa: ℞. Sea Salt, 1 lb.; Fluidextract of Eucalyptus or Specific Medicine Eucalyptus, fl ʒ ss. Mix in a glass or tin container. Sig.: One tablespoonful to 1 pint of *hot* water, and inject with a *glass* syringe. All preparations of eucalyptus may be used from full strength to any desired dilution upon old ulcers, wounds, gonorrhœal discharges, ozæna, septicæmia, and gangrene; all with free but fetid discharges. Inhalations of them are especially useful in pulmonary gangrene.

Internal. Eucalyptus is a fine stimulating expectorant for broncho-pulmonary catarrhal disorders, when no very active inflammation is present. It restrains discharges, facilitates expectoration, and deodorizes and antisepticizes the sputum. Chronic bronchitis, bronchorrhœa, and the debility, with difficult expectoration, lingering in the wake of broncho-pneumonia and lobar pneumonia are conditions in which it is of very great value.

Agents of this type, which may be compared to the turpentines, and which influence the respiratory membranes, usually are valuable for similar uses in the urino-genital tract. Thus we find eucalyptus an alterative and antipyic in pyelitis and in catarrhal and purulent cystitis, particularly in the aged. Being eliminated by all the mucous surfaces, it exerts its antiseptic influence upon them in all parts of the body. While the oil and eucalyptol are popular with many, we prefer the specific medicine or the fluidextract for most purposes.

Eucalyptus is a stimulating antiseptic for the angina of scarlatina, for which by some it is administered internally. This should be done with great care, however, for the drug is liable to produce congestion of the kidneys, one of the dreaded complications which is easily provoked in the acute exanthemata. If acute desquamative nephritis is present it should not be

employed; in the advanced stage of chronic nephritis with very marked fetor in the urine, and scanty secretion of urine, very small doses of eucalyptus may be cautiously tried. Eucalpytus and its preparations are distinctly contraindicated when acute inflammation of any part exists.

The antimalarial properties of eucalyptus are taken advantage of in cases of malarial infection that do not respond to quinine or in which the quinine has an otherwise undesired effect. The more chronic the cases—without distinct cycles—the better the drug seems to act. It is also naturally used for many of the complications or results of chronic malarial cachexia, as periodic headache and neuralgia. It is only in occasional cases of malarial fever that it does a great deal of good, especially acting best if there are exhaustive discharges, but it is never without some beneficial power. It is not to be compared to cinchona medication in the ordinary run of malarial fevers. Used according to indications as given above, eucalyptus is a very satisfactory and pleasant medicine. It is best given in syrup or glycerin.

EUONYMUS.

The bark of the root of *Euonymus atropurpureus*, Jacquin (Nat. Ord. Celastrinaceæ). A small shrub or bush of the United States. *Dose*, 5 to 60 grains.

Common Names: Wahoo, Indian Arrow-wood, Burning Bush, Spindle Tree.

Principal Constituents.—A bitter glucoside *euonymin*, closely resembling digitalin; *asparagin*, and euonic acid. (Euonymin should not be confounded with the resinoid of the same name employed by the early Eclectics.)

Preparation.—*Specific Medicine Euonymus. Dose*, 5 to 60 drops.

Specific Indications.—Yellow-coated tongue; anorexia; indigestion and constipation, due to hepatic torpor; prostration with irritation of the nerve centers; periodic diseases, to supplement the action of quinine.

Action and Therapy.—Wahoo sharpens the appetite, improves digestion, stimulates the hepatic function, and increases nutrition. It has decided laxative properties and is to some extent antiperiodic. Locke declared it one of the few good stomach tonics. Its antimalarial influence is best displayed after the chill has been broken by quinine. It may then be given as a tonic, and it materially assists in preventing a recurrence of the paroxysms. However, it is not a major remedy in intermittents, and general tonic effects are chiefly to be expected. It acts much better in the gastric debility following intermittent fevers than during the active attacks. Euonymus is a good stomachic bitter in atonic dyspepsia with malarial cachexia, or when due to faulty and torpid action of the liver. Many value it in so-called chronic ague, and in the constipation and gastric debility associated with or following it. Euonymus is a neglected bitter.

EUPATORIUM.

The flowering tops and leaves of *Eupatorium perfoliatum*, Linné (Nat. Ord. Compositæ). Swamps and low meadows throughout the United States. *Dose*, 5 to 60 grains.

Common Names: Boneset, Thoroughwort, Indian Sage, Ague Weed, Through-Stem, Thorough-Wax, Crosswort, Vegetable Antimony.

Principal Constituents.—Volatile oil, tannin, and a soluble, bitter glucoside—*eupatorin*.

Preparations.—1. *Specific Medicine Eupatorium. Dose*, 5 to 60 drops.
2. *Infusum Eupatorii*, Infusion of Boneset. *Dose*, 1 to 4 fluidrachms.

Specific Indications.—Large full pulse, the current showing little waves; skin hot and full, with a tendency to become moist, even during the progress of fever; deep-seated aching pain (so-called "bone pains") in muscles and periosteum; cough, embarrassed breathing, and pain in the chest; urine turbid and urination frequent; influenzal cough and aching pain.

Action.—Eupatorium, in small doses, acts as a simple bitter; in large doses it is emetic. Given in hot infusion it causes both emesis and profuse diaphoresis; sometimes catharsis also results. In cold infusion, or small doses of the alcoholic preparations, it is tonic and aperient. It also has marked but unexplainable antimalarial properties.

Therapy.—Eupatorium is an old American drug that has found its way into general medicine through aboriginal and domestic usage. Formerly it was a favorite emetic and was successfully used at the outset of fevers of the bilious remittent and intermittent types. Its antiperiodic properties were well known and used to advantage in ague districts many years ago. Its property of relieving deep-seated pain was also early recognized, obtaining for it the vulgar name of "Boneset". It is now seldom, or never, used as an emetic chiefly because emetics are not often employed, and also on account of the bitterness of the drug and the quantity of infusion required. Its thoroughness as such, however, cannot be questioned, and it has no poisonous or depressing qualities. Eupatorium is now used in malarial affections of the irregular and masked types, and particularly those not benefited by quinine. The chill and succeeding fever are slight, the skin dry, and not, as a rule, followed by perspiration; there is deep-seated, aching pain, as if "in the bones", præcordial oppression, and great thirst. If, however, the fever lasts all day, slight sweating may occur at night. An added indication in ague is vomiting, especially of much bile. Formerly the hot infusion was given to emeto-catharsis, and followed during the intermission with tonic doses of the cold infusion. This is now known to be unnecessary, full doses, short of nausea, of the alcoholic preparations being fully as efficient. Malarial headache, with irregular intermittence, is also relieved by small doses of the drug.

Eupatorium is an admirable remedy "to break up a common cold," especially when accompanied by deep-seated, aching pain and slight or no fever. If there are pleuritic pain and hoarseness, it is also valuable. In every epidemic of influenza it has been used with great advantage. During the severe pandemic of 1918-19 it was one of the safest and most successful remedies employed and contributed much to the successful management of the disease under Eclectic treatment. By many it came to be used as a prophylactic, persons taking it freely apparently escaping attack. Notwithstanding this, its prophylactic power, if it has any, is as yet unexplained and should not be seriously relied upon. That cases were rendered milder, deep-seated pain promptly relieved, cough and respiratory irritation lessened, and recovery expedited under the liberal administration of eupatorium is a matter of record. It is especially valuable to relieve the intolerable backache and pain in the limbs. Eupatorium often relieves periosteal pain of a neuralgic type, particularly if associated with malarial infection, but it renders no service in that caused by inflammation or by syphilitic or other organic changes in the periosteum.

In respiratory affections boneset is efficient to relieve cough, acting best in that occurring in the aged and debilitated, where there is an abundance of secretion, but lack of power to expel it. It also relieves hoarseness, and sometimes benefits in humid asthma. It is one of the best of medicines to relieve the irritable cough of measles, but care must be taken not to push its effects to nausea and vomiting. For children it is best administered in an aromatized syrup. In pneumonia it relieves chest pains and cough, and for these purposes may be employed in the early stage of acute lobar, but more effectually in broncho-pneumonia. After the active stages have passed it again becomes useful to allay the irritable after-cough and to assist in expectoration when bronchorrhœa occurs. Being tonic and stomachic, when given in small doses it improves the appetite and digestion and thus favors a more rapid and perfect convalescence.

EUPATORIUM PURPUREUM.

The root of *Eupatorium purpureum*, Linné (Nat. Ord. Compositæ). Low meadows and woods of the United States. *Dose*, 5 to 60 grains.

Common Names: Queen of the Meadow, Gravel Weed, Gravel Root, Joe Pye Weed.

Principal Constituents.—Volatile oil and a resin (*eupatorine*).

Preparations.—1. *Specific Medicine Gravel-Root. Dose*, 1 to 60 drops.

2. *Decoctum Eupatorii Purpurei*, Decoction of Gravel Root (℥j to Water, Oj). *Dose*, 1 to 3 fluidounces.

Specific Indications.—Vesical irritation; incontinence of urine, painful and frequent urination; pain and weight in loins extending to the bladder; scant and milky urine with admixture of blood and mucus.

Action and Therapy.—While of some value in chronic gastro-intestinal irritation, with catarrhal secretion, and in some forms of cough, with free expectoration, the chief use of gravel-root is to relieve chronic irritation of the urinary passages. For this purpose it is one of the most satisfactory of medicines. It is adapted to cases in which there is constant urging to pass urine, accompanied by a sense of obstruction, and the excretion is mixed with mucus and blood. Though not curative, it is often invaluable in chronic nephritis, to meet many of the unpleasant urinary symptoms. For the uric acid diathesis gravel-root is one of the best of drugs. It will not, as has been claimed, dissolve gravel, but by its diuretic action it eliminates those particles which may form the nuclei of larger concretions. Besides, its effects upon irritated or inflamed parts due to such deposits when present is to soothe and heal them. It especially relieves the deep-seated pelvic perineal aching common to sufferers from cystitis and subacute prostatitis. For passive hematuria it is one of the best drugs we possess. When hydragogues have been used to deplete the body in ascites, gravel-root, by stimulating diuresis, greatly retards the re-establishment of the effusion.

Gravel-root relieves the urinary disturbances of pregnancy so far as difficulty in voiding urine is concerned. It is also very useful in prostatitis, acting best after the acute inflammatory condition has been subdued.

Gravel-root is a neglected drug and often should be employed in urinary disorders where less efficient and more harmful agents are displayed. High-colored urine, with blood and solids and voided with pain, and milky-looking urine, should lead one to hope for good results from its use. If the specific medicine is administered it should be given in hot

water. The decoction is often the best form of administration. It acts well with the special sedatives, and if fever is present or the skin is hot, dry, and constricted it may be given with aconite or gelsemium.

EUPHORBIA COROLLATA.

The bark of the root of *Euphorbia corollata*, Linné (Nat. Ord. Euphorbiaceæ). Dry fields and woods of Canada and the United States.

Common Names: Large Flowering Spurge, Blooming Spurge, Milk Purslane, Snake Milk.

Principal Constituents.—Resin, caoutchouc, and probably *euphorbon*.

Preparation.—*Specific Medicine Euphorbia. Dose*, 1/10 to 10 drops.

Specific Indications.—Persistent gastric irritation; irritative diarrhœa of catarrhal discharges, with debility; long-pointed tongue, with prominent papillæ; uneasy sensation in the stomach; cholera infantum, with hot, tumid abdomen and constant desire to defecate, the stools being greenish and irritating; irritation of the respiratory tract, especially the glottis, with persistent cough and tough and tenacious secretion.

Action and Therapy.—In full doses euphorbia is a comparatively mild emetic; in overdoses it causes drastic emeto-catharsis. It was formerly used to fulfill the purposes of an emetic and purgative in dropsical conditions. It is now used chiefly in small doses for irritation of the gastro-intestinal and respiratory tracts. It often relieves diarrhœa and dysentery, with full and tenesmic passages. It is especially useful in cholera infantum, with hot, tender abdomen and constant desire to go to stool, the discharges being greenish and irritating. Euphorbia is a good gastro-intestinal sedative and tonic, and is most effective when the tongue is red, long and pointed, and there is persistent vomiting. In moderate doses it may be used in obstinate constipation, with evidence of gastric irritation. Euphorbia is contraindicated by active inflammation.

Bowles (*Eclectic Medical Journal*, 1921, page 459) praises Euphorbia as an excellent sedative for persistent, irritative cough following influenza, and that due to chronic catarrhal inflammation of the larynx and pharynx. The glottis seems especially irritable and the cough is exasperating—worse from riding or walking in the cold air, or is aggravated by exertion after a full meal. There is but little secretion, and that is tough, tenacious, and glutinous, and requires persistent hawking to aid in its expectoration. One or two drops may be taken upon the tongue and slowly swallowed; or 40 drops of Specific Medicine Euphorbia may be added to 4 ounces of water, and of this a teaspoonful may be taken every 2 hours. Bowles also used it, with phytolacca and phosphate of hydrastin, to reduce enlarged tonsils following tonsillitis.

The American species of Euphorbia furnish a rich field for restudy. Formerly some of them were quiet extensively used as medicines, but seem to have been crowded out by similarly-acting foreign drugs.

The chief indications for Euphorbia are: profuse mucous discharges, whether from the pulmonic, gastro-intestinal, or urino-genital mucosa; or the tough, glutinous tracheo-broncho-pulmonic secretions, with irritation.

EUPHORBIA HYPERICIFOLIA.

The entire plant *Euphorbia hypericifolia*, Linné (Nat. Ord. Euphorbiaceæ). A common weed in rich soils of gardens and waste places throughout the United States.

Common Names: Large Spotted Spurge, Garden Spurge.

Principal Constituents.—Tannin, gallic acid, and a caoutchouc-like body.

Preparation.—*Specific Medicine Spotted Spurge. Dose*, 1 to 10 drops.

Specific Indications.—Gastro-intestinal irritation with greenish and irritant passages.

Action and Therapy.—True, testing this plant upon himself, found the infusion to produce a full frontal headache, similar to but less severe than that caused by macrotys, with an unpleasant fullness with oppression at the epigastrium, and a sense of languor and drowsiness. Intense constipation followed. He concluded that it is a cerebral stimulant, and secondarily a sedative to the brain and sympathetic nervous system.

The drug is valuable in gastro-intestinal irritation with watery and mucoid discharges, having been used most successfully in cholera infantum, cholera morbus, muco-enteritis and dysentery, after the acute inflammation has subsided. For the first-named child's disorder it is one of the most certain of sedative-astringents.

EUPHORBIA IPECACUANHA.

The bark of the root of *Euphorbia Ipecacuanha*, Linné (Nat. Ord. Euphorbiaceæ). A perennial found in dry sandy soils on the Atlantic seaboard from Long Island south and west to the Middle States.

Common Names: American Ipecac, American Ipecacuanha, Wild Ipecac, Ipecac Spurge.

Principal Constituents.—An active resin and *euphorbon.*

Preparations.—1. *Fluidextractum Euphorbiæ Ipecacuanhæ*, Fluidextract of Euphorbia Ipecacuanha. *Dose*, 1 to 10 drops.

2. *Tinctura Euphorbiæ Ipecacuanhæ*, Tincture of Euphorbia Ipecacuanha (℥viij to Alcohol, 76 per cent Oj). *Dose*, 1 to 10 drops. (*Usual form of Administration.*—Tincture of Euphorbia Ipecacuanha, gtt. xx, Water, q. s. fl℥iv. Mix. Sig.: One teaspoonful every 2 or 3 hours.)

Action and Therapy.—This is an old American medicine that was formerly employed as a substitute for ipecac. It is less active than Euphorbia corollata, but like it produces emeto-catharsis. In small doses it quiets irritation of the mucous membranes, proving useful in both gastro-intestinal and bronchial disorders. The indications and uses are practically the same as those given for Euphorbia corollata, which see. Besides, it has been advised in irritative dyspepsia, and jaundice with obstinate hepatic torpor. For the latter purposes the larger doses are to be employed.

EUPHORBIA PILULIFERA.

The whole plant *Euphorbia pilulifera*, Linné (Nat. Ord. Euphorbiaceæ). A plant of tropical climes and throughout the gulf states of the United States.

Common Names: Pill-bearing Spurge, Cat's Hair, Queensland Asthma Weed.

Principal Constituents.—Resins of a glucosidal character, tannin, and salts of potassium, sodium, magnesium, and silica.

Preparation.—*Specific Medicine Asthma Weed. Dose*, 1 to 30 drops.

Specific Indications.—Spasmodic and dyspnœic breathing with bronchial irritation.

Action and Therapy.—A remedy for spasmodic asthma and coughs of a convulsive character due to recent colds. It is somewhat anodyne as well as antispasmodic and expectorant, and is asserted useful in the irritative, teasing, and paroxysmal coughs of the chronic bronchitis of old persons and consumptives. It is also said to relieve dyspnœa of cardiac origin and to be of some use in emphysema. It may be administered in syrup, if desired.

EUPHRASIA.

The plant *Euphrasia officinalis*, Linné (Nat. Ord. Scrophulariaceæ). Europe and America. *Dose*, 1 to 30 grains.

Common Name: Eyebright.

Principal Constituents.—An acrid, bitter principle and a volatile oil.

Preparation.—*Specific Medicine Euphrasia. Dose*, 1 to 60 drops.

Specific Indications.—Acute catarrhal diseases of the eyes, nose, and ears; fluent coryza with copious discharge of watery mucus. "Secretion of acrid mucus from the eyes and nose with heat and pain in the frontal sinus" (Scudder).

Action and Therapy.—An admirable remedy for acute catarrhal inflammations of the nasal and ocular membranes, with profuse, watery secretion or abundant flow of acrid mucus, and attended with heat, pain, burning, and sneezing. It is one of the most certain agents in acute coryza and in mucous ophthalmia, with abundant lacrimation. It is equally effective when acute catarrhs extend to the ears through the Eustachian passages, and are attended by earache, headache, sneezing, and coughing. Euphrasia is useful both to prevent and to relieve, in the early stages, acute frontal sinusitis. During or following measles it controls the distressing catarrhal symptoms. In all disorders its most direct indication is profuse watery discharge with acute inflammation or irritation. It is less valuable in the catarrhal disorders of the gastro-intestinal tract.

Euphrasia is a striking example of a simple drug that has acquired a great and exaggerated reputation in folk-medicine. Euphrasia means "good cheer, or delight," and refers to its reputed "effects upon the spirits through its benefits to the sight" (Millspaugh). It once enjoyed a great but unsustained reputation as a cure for all diseases of the eye, even becoming the theme of the poet's pen—Milton referring to it in *Paradise Lost*, as purging "the visual nerve." It came into Eclectic medication from Homœopathic sources, but with some modifications of symptomatology. The characteristic symptom calling for it is acridity of the discharges, and this is emphasized by Homœopathic writers. It matters little whether the discharges be thin and watery, or thick and yellow—they are free, biting and excoriating, making the lids red and sore. It is essentially a remedy for catarrhal states and for superficial, not deep, eye disorders. Accumulation upon the cornea of sticky mucus befogging vision is a euphrasia indication. With such ocular disorders is usually more or less coryza, which may be far less hot and biting, or may be bland. The drug has proved especially useful in the epidemics of la grippe in recent years to control the profuse lachrimation. Euphrasia sometimes proves serviceable in hay fever, having the characteristic discharges above mentioned.

FABIANA.

The leaves and branches of *Fabiana imbricata*, Ruiz and Pavon (Nat. Ord. Solanaceæ). A Chilean tree-like shrub.

Common Name: Pichi.

Principal Constituents.—Resin, *fabianine* (?), a supposed alkaloid, and an æsculin-like body.

Preparation.—*Fluidextractum Fabianæ*, Fluidextract of Fabiana. *Dose*, 5 to 60 drops.

Action and Therapy.—A remedy for functional catarrhal diseases of the stomach, kidneys, and bladder. Like all the terebinthinates when given in small doses, it is of some value in vesical pain with frequent urination, cystic irritation, with dysuria and vesical tenesmus, and in nocturnal urinal incontinence. It is asserted useful in acute albuminuria, with blood in the urine, and due chiefly to renal hyperæmia, but should be avoided in chronic nephritis. Pichi has no curative effects upon pathologic tissues, but is a remedy for functional defects alone.

FARINA TRITICI.

The sifted flour of the grain of *Triticum sativum*, Lamarck (Nat. Ord. Graminaceæ).

Common Names: Wheat Flour, Common Flour.

Principal Constituents.—Starch, vegetable albumin, and proteids of gluten, (gluten-fibrin, mucedin, and gliadini), and a small amount of allantoin.

Derivative.—*Furfures Tritici*, Bran.

Action and Therapy.—*External.* Bread made of wheat flour is an excipient of some pills, and forms the basis of the bread and milk poultice. Wheat-flour paste well thinned is emollient and may be used per rectum for the administration of medicines in colitis. Rarely wheat flour is used as a dusting powder for burning and itching surfaces, as in urticaria, erysipelas, sunburn, and mixed with molasses promptly relieves the pain in burns and scalds. Infusion of bran is a useful emollient for rough skin, and assists in removing the odor of such agents as iodoform.

Internal. A thinned paste of wheat flour is demulcent and may be used to protect an irritated stomach and œsophagus in cases of irritant and corrosive poisons. In the absence of starch it may be used to antidote poisoning by iodine. Bran, mixed with stewed fruits or baked in a biscuit or cake, is a common mechanical laxative for habitual constipation, often proving more effective than medicines.

FEL BOVIS.

Oxgall, Oxbile. The fresh bile of *Bos Taurus*, Linné (Family, Bovidæ), the Common Ox.

Description.—A brown-green or dark-green, disagreeably bitter, and somewhat viscous liquid, having a peculiarly unpleasant taste. Neutral or slightly alkaline in reaction. Used in preparing Extract of Oxgall.

Principal Constituents.—Bile acid salts (*glycocholates* and *taurocholates*), and bile pigments (*bilirubin*, *biliverdin*, *bilifuscin*, etc.), and *cholesterin*.

Preparation.—*Extractum Fellis Bovis*, Extract of Oxgall, (Powdered Extract of Oxgall). *Dose*, 1 to 5 grains.

Action and Therapy.—Common oxgall is used by the laity for the gall-stone diathesis, and the purified form by physicians whenever there is a deficient supply of normal bile, particularly in chronic constipation with clay-colored stools, in jaundice and in intestinal dyspepsia, due to hepatic torpor.

FERRI ARSENAS.

Iron Arsenate, Ferrous Arsenate. (Formula: Fe_32AsO_4.)

Description.—An amorphous, odorless and tasteless olive or blue-green powder; insoluble in water and alcohol. *Dose*, 1/16 to 1/12 grain.

Action and Therapy.—This was at one time thought to retard cancerous growths, but time has proved it of no value for that purpose. It is chiefly used in anemic persons with herpetic and dry, scaly skin diseases, and in the anemia following, or associated with, chronic diarrhœa.

FERRI BROMIDUM.

Ferrous Bromide, Bromide of Iron.
(Formula: $FeBr_2$).

Description.—A deliquescent salt of a yellow color, having an extremely styptic taste, and very soluble in water. Like iodide of iron it is unstable and should be employed in the form of a syrup, as sugar tends, in a measure, to prevent its decomposition.

Preparation.—*Syrupus Ferri Bromidi*, Syrup of Bromide of Iron. *Dose*, 1/2 to 1 fluidrachm.

Action and Therapy.—*External.* An ointment of Bromide of Iron, Glycerin, aa, 1 part; Adeps, 14 parts, is sometimes used as a resolvent for scrofulous swellings and various glandular enlargements.

Internal. A syrup in doses of 1/2 to 1 fluidrachm is given at the same time that the above local treatment is being applied. It is also advised as a resolvent in cutaneous diseases with glandular involvement, and in anemia with chorea. It is uncertain, somewhat toxic, and has little to commend it.

FERRI CARBONAS SACCHARATUS.

Saccharated Ferrous Carbonate, Saccharated Carbonate of Iron.

Description.—A greenish-brown, odorless powder, gradually oxidizing on exposure to air, and having at first a sweetish, followed by a weak iron-like taste. Soluble partially in water, but completely dissolved by hydrochloric acid, with effervescence, forming a clear greenish-yellow liquid. *Dose*, 5 to 20 grains in pill.

Related Preparations. 1. *Massa Ferri Carbonatis*, Mass of Ferrous Carbonate (Vallet's Mass). A greenish-gray, soft, pilular mass, becoming greenish-black or blackish on exposure, and having a strongly ferruginous taste. *Dose*, 3 to 5 grains in pill.

2. *Pilulæ Ferri Carbonatis*, Pills of Ferrous Carbonate. (Blaud's Pill. Pills of Iron.) *Dose*, 1 to 5 pills.

There are many modifications of Blaud's Pill, and compounds designed to form the Blaud Pill Mass upon contact with water and the contents of the stomach. Besides they are also compounded with active agents like strychnine, quinine, etc.

Action and Therapy.—This is one of the most useful forms of iron. Blaud's pills are especially valuable in anemia, with involvement of the reproductive tract of women—especially disordered menstruation, either too frequent, or altered in character, or when not appearing regularly, and associated with general debility and low nerve tone. In the latter instance the compound pills of the Blaud type, containing nerve stimulants, of which there are numerous kinds, are the most effectual. If they contain arsenous acid they should not be administered after palpebral œdema appears. The general uses of carbonate of iron are those mentioned under *Ferri Subcarbonas*, which see.

FERRI CHLORIDUM.

Ferric Chloride, Chloride of Iron, Perchloride of Iron, Sesquichloride of Iron. (Formula: $Fe_2Cl_6+12H_2O$).

Description.—An orange-yellow, crystalline salt, without odor, or having but a weak odor of hydrochloric acid. It is powerfully styptic to the taste. Very deliquescent upon exposure to the air. Freely and completely soluble in water, alcohol, and by ether and glycerin. Unstable in the light, being reduced to ferrous chloride.

Action and Therapy.—Ferric Chloride is used only in solution as *Liquor Ferri Chloridi* and as *Tinctura Ferri Chloridi* (which see).

FERRI DIALYSATUM.

Dialyzed Iron, Liquor Ferri Dialysatus.

Description.—A deep red solution, almost devoid of taste, odorless, and freely miscible with distilled water, glycerin, or syrup. *Dose*, 10 to 20 drops.

Action and Therapy.—A preparation of negative physical properties and physiological effects, introduced as being a ferric compound most nearly like the iron in the blood. It has been recommended to antidote poisoning by arsenic. It is, however, none too certain in this respect. Dialyzed iron was probably the first inorganic colloid used in medicine.

FERRI ET AMMONII CITRAS.

Iron and Ammonium Citrate, Ammonio-Citrate of Iron, Soluble Citrate of Iron, Soluble Ferric Citrate, Ammonio-Ferric Citrate.

Description.—This compound occurs in transparent, thin, garnet-red scales. It has no odor, but a saline and weak ferruginous taste. In the presence of moisture it deliquesces. Alcohol does not dissolve it, but it is easily soluble in water.

Action and Therapy.—Ammonio-citrate of iron is among the best preparations of iron, and one that is unirritating, pleasant to the taste, and soluble in water, wine, or syrup. It is an excellent tonic, being especially good for children. It is not unpleasant, does not restrain the bowels, and is very readily assimilated. It is most largely used in anemic conditions of children and women. The skin is pale and translucent and membranes pallid, respiration quickened, appetite morbid, and the patient restless and nervous. For a child from five to ten years old, give doses of from two to five grains three times a day, dissolved in a teaspoonful of water or syrup. It is a good chalybeate in atonic dyspepsia, with marked anemia and irritability of the stomach. If not well assimilated, gentian may be given with it. It is a good agent in scrofulous conditions of children, and in tabes mesenterica, given in doses of from two to five grains in syrup three times a day. In chlorotic females the same sized dose given with a bitter tonic improves the blood, appetite, and general strength.

FERRI ET AMMONII SULPHAS.

Iron and Ammonium Sulphate. Ammonia Ferric Sulphate. Ammonio-Ferric Alum. Iron Alum. (Formula: $[(NH_4)_2Fe_2(SO_4)_4.\ 24H_2O)]$

Description.—Odorless, pale violet crystals having an acid, styptic taste, and efflorescent upon exposure to air. Very soluble in water, insoluble in alcohol. *Dose*, 3 to 15 grains.

Action and Therapy.—Iron alum was introduced by W. Tyler Smith as the most effective iron salt for leucorrhœa, with anemia. He advised 3 to 15 grains, in infusion of calumba, or water, repeated three times a day.

It is extremely astringent, more so than ordinary alum, and is less stimulating than the other ferric salts. *Potassio-ferric alum* is a similar compound and known also as Iron Alum. It is used for the same purposes as the ammonio-ferric alum.

FERRI ET AMMONII TARTRAS.

Iron and Ammonium Tartrate, Ammonio-Tartrate of Iron.

Description.—This salt forms in slightly deliquescent, thin, transparent scales, from garnet to red-brown in color. Its taste is sweetish and feebly ferruginous, and it is devoid of odor. Insoluble in alcohol, but very easily dissolved by water. *Dose*, 5 to 10 grains.

Action and Therapy.—This is a mild tonic. It has the advantage of being very soluble in water and is unirritating and pleasant to the taste. It may be given in pill, capsule, or syrup in doses of from 1 to 10 grains.

FERRI ET POTASSII TARTRAS.

Iron and Potassium Tartrate, Potassio-ferric Tartrate, Tartarated Iron.

Description.—Odorless, thin, transparent, garnet-red to reddish-brown scales, having a slightly ferruginous, sweetish taste; slightly deliquescent in the air. Very soluble in water; slightly in alcohol. *Dose*, 5 to 20 grains.

Action and Therapy.—Owing to the large proportion of iron, the pleasant taste, mild astringency and kindly action upon the stomach and bowels, this salt is regarded one of the most desirable of the scaled compounds of iron. It is given in solution before meals.

FERRI ET QUININÆ CITRAS.

Iron and Quinine Citrate, Soluble Iron and Quinine Citrate.

Description.—Thin, transparent, greenish or golden-yellow scales, odorless, and of a bitter, mild, iron-like taste; slowly deliquescent in damp air. Slowly and completely soluble in cold water and but partially soluble in alcohol. *Dose*, 5 to 10 grains.

Action and Therapy.—Tonic and antiperiodic; and especially useful in the anemia following malarial fevers. Give 5 to 10 grains in capsule, aromatic solution, or syrup, repeated three times a day after meals.

FERRI ET STRYCHNINÆ CITRAS.

Iron and Strychnine Citrate.

Description.—Thin, transparent, garnet-red to yellowish-brown scales; without odor, and of a bitter, slightly ferruginous taste; deliquescent in damp air. Soluble in water; partially soluble in alcohol. *Dose*, 1 to 3 grains.

Action and Therapy.—Five grains of this scaled salt contains 1 20 grain of strychnine. It is useful in nervous debility, dyspepsia in atonic subjects, chlorosis, and suppressed menstruation. From 1 to 3 grains in pill or capsule may be given before meals. It should not be given in solution.

A similar preparation is the *Ferri et Quininæ Citras cum Strychnina* or Iron and Quinine Citrate with Strychnine. Five grains contain 1, 20 grain of strychnine and 1 grain of quinine. The dose is 1 to 3 grains.

FERRI FERROCYANIDUM.

Ferric Ferrocyanide, Prussian Blue, Ferrocyanide of Iron, Insoluble Prussian Blue.

Description.—A beautiful, deep-blue, bulky powder, devoid of taste, and insoluble in water. *Dose*, 1 to 5 grains.

Action and Therapy.—This is tonic and is believed by some to be antiperiodic. It is usually given with quinine. Such a mixture constituted the once celebrated "Eclectic blue powder", and was used in periodic disorders regardless of the presence of fever. Administered in doses of about 3 grains four times a day.

FERRI HYDROXIDUM CUM MAGNESII OXIDO

Ferric Hydroxide with Magnesium Oxide. Ferric Hydrate with Magnesia. Arsenic Antidote.

To be freshly prepared as needed from the following:

Bottle No. 1. Dissolve 1 3/4 ounces of Ferric Sulphate in 3 1/2 ounces of water and keep the liquid in a large well-stoppered bottle.

Bottle No. 2. Rub 2 1/2 drachms of Magnesium Oxide in cold water until a smooth, thin mixture results. Transfer this to a large bottle holding about 1 quart, and dilute the mixture with water until the bottle is about two-thirds filled. When the antidote is wanted, shake the magnesia mixture to a homogeneous, thin magma, add to it the iron solution, and shake them together until a uniform smooth mixture results.

☞ The diluted solution of ferric sulphate, and the mixture of magnesia, should always be kept on hand, ready for immediate use.

This preparation, intended as an antidote to arsenic, is a mixture of ferric hydroxide, magnesium hydroxide, and magnesium sulphate. It should be freshly prepared so that the ferric hydroxide will be in its most efficient condition, and not impaired, as is certain to be the case if the preparation be kept for a length of time. It is not necessary to separate the liquid from this preparation, as none of the ingredients are in any way caustic or objectionable, the magnesium sulphate present being desirable as a cathartic to carry off by the bowels such portions of the insoluble arsenical compound as may not be ejected in the act of emesis, or removed by the stomach-pump. As an excess of magnesia is used in preparing it, acidity is avoided.

Specific Indication.—Acute poisoning by arsenic.

Action and Therapy.—Antidote to acute arsenical poisoning. It should be administered like the ferric hydroxide, freely in tablespoonful doses. The magnesia itself is somewhat antidotal to arsenous acid, besides acting as a cathartic.

FERRI HYPOPHOSPHIS.

Ferric Hypophosphite, Iron Hypophosphite.
(Formula: $Fe_26(PH_2O_2)$.)

Description.—A permanent, odorless and nearly tasteless white or grayish-white powder, but slightly soluble in water, but more readily in hypophosphorous acid, or warm, strong solution of an alkaline citrate. *Dose*, 5 to 10 grains.

Action and Therapy.—Sometimes used in anemia with cerebral enfeeblement. It is given in powder or pill, but preferably in syrup.

FERRI LACTAS.

Ferrous Lactate, Lactate of Iron. (Formula: $Fe(C_3H_5O_3)_2+3H_2O$)

Description.—Pale, greenish-white crusts, consisting of small needle crystals, having a slight peculiar odor, and a mild, sweetish, ferruginous taste. Soluble in water (40), boiling water (12); also insoluble in alcohol. *Dose*, 5 grains.

Action and Therapy.—An efficient chalybeate in anemia, and amenorrhœa and dysmenorrhœa in persons of low vitality. From 1 to 3 grains, gradually increased, may be given, in solution, every 3 or 4 hours. It has no special advantages over the old milder iron salts.

FERRI OXIDUM HYDRATUM.

Ferric Hydrate, Ferric Hydroxide, Hydrated Oxide of Iron, Hydrated Peroxide of Iron, Hydrated Sesquioxide of Iron.

Description.—A brownish-red magma, completely dissolving, without effervescence, in hydrochloric acid. This compound *must be prepared as needed*, as it will not retain its antidotal powers if it has been made for any considerable length of time. Every physician should be prepared to make this compound. To prepare it proceed as follows: "Mix either solution of ferric chloride or solution of ferric sulphate with four times its bulk of cold distilled water, and add to this, with constant stirring, ammonia water until the latter is in slight excess. Drain the precipitate on a muslin strainer and wash it well with cold distilled water." (Lloyd's *Chemistry of Medicines*, p. 311.) Ordinary drinking water may be employed if distilled water be not at hand, and if great hurry is necessitated the magma need not be washed, but may be administered freely at once.

Action and Therapy.—This agent is the *antidote to arsenic poisoning*. It converts arsenious acid into arsenite of iron, a comparatively harmless salt. It and the Ferri Hydroxidum Cum Magnesii Oxido (which see) are the best antidotes known in these cases. In poisoning with arsenic evacuate the stomach as soon as possible, then give this magma in tablespoonful doses. If the stomach can not be promptly emptied do not wait, but administer the antidote liberally. Thirty-five parts are needed to neutralize one part of arsenic.

FERRI PHOSPHAS.

Ferric Phosphate, Soluble Ferric Phosphate, Phosphate of Iron, Soluble Phosphate of Iron.

Description.—Apple-green scales, transparent, and having no odor, but an acidulous and feebly saline taste. Insoluble in alcohol, but readily soluble in water. It is apt to be dark in color if exposed to light. *Dose*, 1 to 10 grains.

Action and Therapy.—This is a nerve tonic. It may be used in cases of debility, with anemia and marked nervous depression bordering on neurasthenia, preferably in doses of 5 grains.

FERRI PYROPHOSPHAS.

Soluble Pyrophosphate of Iron, Pyrophosphate of Iron with Sodium Citrate.

Description.—Thin, apple-green, transparent scales, odorless, and of an acidulous, slightly saline taste; permanent in dry air when excluded from light, but becoming dark and discolored on exposure to light; freely soluble in water, insoluble in alcohol. *Dose*, 5 grains.

Action and Therapy.—A good salt of iron, to be given when mild iron compounds are indicated. Its ready solubility makes it popular for addition to syrups and solutions. It has no harsh or unpleasant effects. From 2 to 5 grains may be given three times a day.

FERRI SUBCARBONAS.

Ferrous Subcarbonate, Iron Carbonate.

Description.—A yellowish-red or reddish-brown powder, but slightly disagreeable to the taste. Insoluble in water, but soluble with slight effervescence in hydrochloric acid. It should not be of a red color, else it has been overheated in preparation. *Dose*, 1 to 5 grains, 3 times a day.

Action and Therapy.—In small doses an unirritating tonic, but large doses produce dyspeptic symptoms. Given with simple bitters, in chlorosis, and with aloes in atonic amenorrhœa. In the anemia of hysteria it may be administered with valerian, scutellaria and camphor; in chorea, with marked anemia, with valerian and macrotys. Combined with hydrastin and capsicum it is useful in atonic dyspepsia and gastric catarrh with anemia;

and it sometimes cures the condition favoring recurrent crops of boils in weak, bloodless and pallid persons. It is not so good a preparation as Vallet's Mass (*Massa Ferri Carbonatis*) or the Blaud pill (*Pilulæ Ferri Carbonatis*), and is less used at the present day than the other forms of iron carbonate.

FERRI SULPHAS.

Ferrous Sulphate, Sulphate of Iron, Green Vitriol.
(Formula: $FeSO_4+7H_2O$.)

Description.—Large, pale, bluish-green, prismatic crystals, odorless, and having a saline and powerfully styptic taste. In dry air the crystals effloresce. If on exposure to damp air it acquires a brownish-yellow coating (basic ferric sulphate) it should be rejected for medicinal purposes. Soluble in cold and boiling water, but not soluble in alcohol. *Dose*, 1/2 to 5 grains.

Preparations.—1. *Ferri Sulphas Exsiccatus*, Dried Ferrous Sulphate (approximately $FeSO_4+3H_2O$). Contains about sixty-five per cent of the above salt, and is a grayish-white powder, slowly but completely dissolved by water. *Dose*, 2 to 5 grains.

2. *Ferri Sulphas Granulatus*, Granulated Ferrous Sulphate. A pale, bluish-green, crystalline powder. *Dose*, 2 to 5 grains.

Action and Therapy.—*External.* A solution of 30 grains of ferrous sulphate in a pint of water is one of the best lotions for the relief of dermatitis venenata caused by poison ivy. Unfortunately it stains. A solution of 2 grains in a pint of water forms a useful injection for rectal prolapse, bleeding piles, and atonic leucorrhœa. A stronger solution may be used as a wash for weeping eczema, venereal sores, and in uterine and rectal cancer to restrain bleeding and to remove the foul odor. The impure salt—copperas—is an inexpensive disinfectant and deodorant for sinks, drains, cesspools, vaults, and latrines; and to sprinkle around where flies breed, as in damp places and manure piles.

Internal. Sulphate of iron is one of the best of the chalybeates in anemia or chlorosis of young women where the menstrual function is suppressed or impaired on account of the poor quality of the blood. A pill or capsule containing 1 grain each of ferrous sulphate, myrrh, and aloes is especially effective, particularly if there is also obstinate constipation. In chronic malarial dyscrasia this form of iron is responded to quickly when given with eupatorium, arsenic, or quinine, as best indicated. Polyuria and the disposition to passive hemorrhages are sometimes relieved by ferrous sulphate. It has no effect upon true diabetes other than to improve the composition of the blood when the hemoglobin content is deficient. In large doses it irritates the bowels and causes diarrhœa; in small doses it is often most beneficial in the chronic diarrhœa of anemia. The dried sulphate of iron is the best form for internal use.

FERRI VALERIANAS.

Ferric Valerianate, Iron Valerianate, Ferric Valerate.

Description.—Permanent, dark brick-red, non-crystalline powder, of variable chemical composition, having the odor of valerianic acid, and a mildly styptic taste. Soluble in alcohol; insoluble in cold water and decomposed by hot water, setting free the valerianic acid. *Dose*, 1 to 3 grains.

Action and Therapy.—A rather feeble medicine, sometimes used as a nerve tonic in various nervous disorders with anemia or chlorosis, such as hysteria, chorea, and neuralgias. Excitability or irritability of the nervous system is the condition in which it acts best.

FERRUM.

Iron. (Symbol Fe.)

Description.—Bright, fine iron wire forms the bases of the many iron preparations in medicine. For consideration of Iron Preparations, see under respective Ferrum Salts.

Specific Indications.—Anemia due to deficiency of hæmoglobin, with debility; deficiency of good blood (anemia), or a watery condition of the blood (hydræmia); debility, feebleness and inertia of the organs of the body; muscular atony and relaxation, with soft, lax or flabby condition of the tissues (Pareira); "solid bluish (sometimes deepening to purplish) color of the mucous membranes and tongue" (Scudder).

Action.—Metallic iron, as such, has no effect upon the body. When solutions of its salts, notably the chloride, sulphate, and nitrate, and to a lesser extent its other compounds, come into contact with the abraded epiderm, the albumen of the tissue is precipitated and an astringent effect is strongly displayed. When in contact with the blood and the secretions, it coagulates them by a similar action. In this way iron is a decided local hemostatic. Moreover, its salts are more or less antiseptic, germicide, disinfectant, and deodorant. The teeth are blackened by iron probably through the union with sulphur and tannin contaminating the mouth; the enamel is corroded by the acid content of many of its salts.

When finely divided metallic iron, or its organic or inorganic salts, are swallowed, they are attacked by the gastric juice and converted at least partially into chloride, the possible exception being chloride of iron itself. A further change into an albuminate is then thought to take place. Passing into the duodenum still another change of at least a portion of it is effected, a carbonate of iron resulting. In this portion of the bowel iron is absorbed by the duodenal epithelia and taken up by the leucocytes, which carry it into the blood current by the pathway of the lymph spaces, mesenteric glands and thoracic duct and deposit it in the spleen to undergo some elaboration into blood-making material. Carried by the blood current it is then stored in the liver and the bone marrow, where further changes take place to await the needs of the blood in the special form of hemoglobin. That which is not required is slowly given up by its depositories and eliminated into the intestinal canal, in the colon and rectum to pass away in the feces. The latter are blackened by the hydrogen sulphide in the intestines, and possibly by tannin, when present, and become more or less hardened. As iron is usually given to excess when administered medicinally, much of it passes unabsorbed by way of the stools. In health but little change in the blood is caused by administered iron, the intake from food and excretion about balancing each other, though some believe it to cause plethora. In anemia, however, its effects are very pronounced, resulting in a marked increase in the number of red discs and in the increase in hemoglobin. The hemoglobin-bearing action of the leucocytes is very great where the deficiency is in the quality of the blood, and less where there is decrease of quantity, as in hemorrhage and other causes than essential anemia or simple chlorosis.

When taken for some time in small doses, iron salts strengthen and sometimes accelerate the pulse, improve digestion, and stimulate function generally. When taken to too great an extent they produce more or less

thirst, pain, or fullness in the head, increased temperature, dizziness, laborious breathing, and unpleasant vascular disturbances in the limbs.

The indications for the use of the preparations of iron are "debility, feebleness, and inertia of the different organs of the body, atony (marked by a soft, lax, flabby condition of the solids), and defect of the red corpuscles of the blood—as where there is a general deficiency of this fluid (anemia, oligæmia) or a watery condition of it (hydræmia)."

These indications of Pareira, uttered nearly a century ago, perhaps, can not be improved upon at the present time. Scudder regarded the deep, solid, blue discoloration of the mucous tissues and tongue, the coloring sometimes deepening to purplish, as the best indication for iron and its salts. Probably anemia is the best indication for iron, especially where the supply of red corpuscles is gradually and permanently diminished. If the loss is due to hemorrhages or other debilitating effects, and the digestive function is in good operation, food would probably be more beneficial than iron; but when the digestion and assimilation are impaired, iron becomes a most important remedy. Not only does it increase the number of red discs, but causes them, when pallid and shrunken, to become florid and plump; their oxygen-carrying powers are increased and better assimilation and nutrition is the result. On the other hand, in anemia, after the proper number and condition of red discs have been attained, its further administration becomes harmful, and, while iron is an important factor in the treatment of this condition, it must not be forgotten that it should constitute only a part of the treatment, and that proper food and hygienic measures should go hand in hand with its administration. Some contend for, and it has been the custom for years to give iron in enormous doses. Inasmuch as but a very little iron can be assimilated and elaborated in the blood, it would appear that the smaller doses would be less apt to provoke gastro-intestinal irritation, thus favoring their absorption. For this reason many prefer the small and even the minute dose, for all excess over that which is elaborated is discharged in the feces, and undoubtedly large doses harm by provoking constipation and other effects not calculated to improve digestion and assimilation. Eclectic physicians, as a rule, have favored the small doses.

When iron is not assimilated and when provocative of gastric disorders, it does harm, and this is particularly the case in certain nervous disorders and particularly in epilepsy. In nervous disorders, it should not be employed unless there is clearly an impoverished condition of the blood. The preparations of iron are contraindicated in fever, acute inflammation, congestion of important organs, active hemorrhages, intestinal irritation, in persons subject to determinations of blood to the head or affected with habitual constipation. Iron and its compounds are, of course, only palliative in structural diseases, as cancer, interstitial nephritis, tuberculosis, etc. Active hemorrhage, as a rule, contraindicates the use of iron. Menorrhagia, however, when profuse and watery, is benefited by it, as well as cases of scanty menses with a pale flow. In both instances the blood is lacking in red discs. Passive hemorrhages, on the contrary, are well treated with iron salts, particularly those made astringent by their union with the acidulous radical of the mineral acids. Tincture of chloride of iron and the acid solu-

tion of iron are valuable to lessen albuminuria in chronic nephritis. Iron is of value in malarial disorders, only in those cases in which the trouble has lasted long enough to induce a marked impoverishment of the blood itself. Ferrocyanide of iron, however, is thought by some to have some power for good in malaria. Iron is therefore applicable where the blood is poor in quality through a deficiency of its red corpuscles, and when associated with this there is marked debility, nervous depression, exhaustive discharges, and feeble digestion. Bearing in mind the indications, it is useful in the following disorders in which its salts have been efficiently employed: Chorea, hypertrophy of the spleen, neuralgia, uterine debility, scrofula, leucorrhœa, rachitis, anemic and chlorotic conditions, chronic discharges from enfeebled and relaxed mucous tissues, chronic paralysis, atonic dyspepsia, albuminuria, desquamative nephritis, diabetes, etc.

The therapeutical influence of the several medicinal salts of iron are nearly the same, but where they become improved or qualified by union with other agents, reference will be made thereto under their respective captions. As a rule, in erysipelas the tincture of the chloride is preferred; the iodide is preferred as an alterative; the salicylate in fetid intestinal discharges; the phosphate in nervous depression; in excessive anemia the stronger preparations like the chloride, sulphate, and acid solution of iron; in ordinary debility the ammonio-citrate, citrate of iron and potassium, or the pyrophosphate, all with or without the addition of quinine or strychnine, etc., are usually selected. When iron is in the form of ferrous oxide it is generally more active than where it is present as a ferric oxide. The various salts of iron and their doses are given under their respective heads.

FERRUM REDUCTUM.

Reduced Iron, Iron by Hydrogen, Quevenne's Iron, (Symbol Fe.).

Prepared by passing hydrogen gas through a hot tube containing freshly prepared, clean ferric oxide.

Description.—A fine, lusterless, grayish-black powder, devoid of odor and taste, and unalterable in dry air. Neither water nor alcohol dissolves it. When poured upon a paper in the form of a conical pile, and a lighted match is applied to the summit of the heap, it should take fire and burn with a red glow. Should it fail to be completely ignited, it has partly changed to an oxide, and is of no value as a medicine. *Dose*, 1 to 10 grains.

Action and Therapy.—Reduced iron is tonic and may be given where iron in a finely divided state is required. It causes unpleasant eructations of gas; otherwise it is a useful chalybeate for anemia and chlorosis. It may be combined with the bitter tonics as gentian, calumba, and cornus, and given in capsule. It is an imperfect antidote for acute poisoning by copper compounds. For this purpose 10 grains may be administered suspended in water.

FICUS.

The fleshy receptacle of *Ficus Carica*, Linné, bearing fruit on its inner surface. (Nat. Ord. Urticaceæ.) Persia and Asia Minor; cultivated in all mild latitudes.

Common Name: Fig.

Action and Therapy.—*External.* Emollient. A roasted, boiled, or raw fig is exceedingly efficient to hasten suppuration in gum boil, boils in the nose or ears and elsewhere, and in buboes and carbuncles. The great surgeon, Billroth, employed a poultice of dried figs and milk to overcome the stench of cancerous and fetid ulcers.

Internal. Nutritive, demulcent, and aperient. Figs are frequently resorted to by individuals inclined to constipation. An elegant aperient confection is employed by the laity under the homely name of "fruitcake." It is prepared by pounding together in a mortar equal quantities of figs, dates, raisins, prunes, and senna leaves. This is wrapped in tinfoil, and sliced off and eaten according to the requirements of the individual.

FŒNICULUM.

The ripe fruit of *Fœniculum vulgare*, Miller (Nat. Ord. Umbelliferæ). *Dose*, 10 to 30 grains.

Common Names: Fennel, Fennel Seeds, Sweet Fennel.

Principal Constituent.—A sweet volatile oil.

Preparations.—1. *Infusum Fœniculi*, Infusion of Fennel (gr. lx to Water, Oss). *Dose* (infants), 1 fluidrachm; (adults), 2 fluidounces.

2. *Specific Medicine Fennel. Dose*, 10 to 60 drops.

Action and Therapy.—A splendid carminative and stimulant for flatulent colic in babies. It should not be sweetened with sugar, as it is sufficiently sweet in itself, while added sugar defeats the purpose for which it is being administered. Hot fennel tea is not an unpleasant remedy for amenorrhœa, and for suppressed lactation. Fennel is often used as a corrigent of unpleasant medicines. It is an ingredient of Compound Licorice Powder.

FRANCISCEA.

The root and stem of *Franciscea uniflora*, Pohl (Nat. Ord. Solanaceæ). A tropical American shrub.

Common Names: Manaca, Vegetable Mercury.

Principal Constituents.—A weak alkaloid *manacine*, and probably gelsemic acid.

Preparation.—*Fluidextractum Franciscea*, Fluidextract of Franciscea. *Dose*, 10 to 60 drops.

Action and Therapy.—Diuretic and probably alterative. It is employed along the Amazon for rheumatism and syphilis. It is capable of producing gastro-enteritis and death. Manaca has been proposed for rheumatism confined more to the muscles and tendons than to the articular forms, acting best when there is dull, heavy pain, soft skin and the absence of fever. It is thought to act somewhat like guaiac.

FRANGULA.

The dried bark of *Rhamnus Frangula*, Linné (Nat. Ord. Rhamnaceæ). Collected at least one year before being used. A shrub of wet situations in Europe, Siberia, and Northern Africa. *Dose*, 2 to 60 grains.

Common Names: Buckthorn, Alder Buckthorn.

Principal Constituents.—The glucoside *frangulin* (*rhamnoxanthin*) and *emodin*, both only found in old bark.

Preparations.—1. *Specific Medicine Frangula. Dose*, 20 to 60 drops.

2. *Elixir Frangulæ*, Elixir of Frangula (Fluidextract of Frangula, 1 part; Elixir of Orange, 4 parts). *Dose*, 1 to 2 fluidrachms.

Action and Therapy.—Fresh frangula bark causes emeto-catharsis and colicky pain. The dried bark is purgative only. A remedy for chronic constipation, a dose of 20 drops of the fluidextract, or a fluidrachm of the elixir, being repeated three times a day.

FRANKENIA.

The plant *Frankenia grandifolia*, Chamisso and Schlectendal (Nat. Ord. Frankeniaceæ). Native of California and sandy soils of adjacent Pacific Coast.

Common Name: Yerba reuma.

Principal Constituent.—Tannin (6 per cent).

Preparation.—*Fluidextractum Frankeniæ*, Fluidextract of Frankenia. *Dose*, 5 to 25 drops.

Action and Therapy.—Used both internally and by injection or spray, for catarrhal diseases and other discharges from the mucous membranes, diarrhœa, vaginal leucorrhœa, gonorrhœa, and gleet, and the different types of catarrh. It is little used.

FRASERA.

The dried root of *Frasera carolinensis*, Walter (Nat. Ord. Gentianaceæ). A striking plant found in the Middle and Southern States, west of the Alleghenies. *Dose*, 5 to 60 grains.

Common Name: American Columbo.

Principal Constituents.—Gentiopicrin, gentistic acid, and berberine. (?)

Preparation.—*Specific Medicine Frasera. Dose*, 5 to 60 drops.

Action and Therapy.—The recent root is reputed cathartic and emetic. When dried it is a simple, mild tonic to be used like the simple bitters. Scudder regarded it as a stimulant to the circulation and to the vegetative functions. Its persistent use in moderate doses is said to have overcome obstinate constipation; like the other simple bitters, it may be of some value in chronic catarrhal dyspepsia. From 5 to 60 drops of Specific Medicine Frasera, well diluted, may be given every four hours.

FRAXINUS.

The dried bark of *Fraxinus sambucifolia*, Lamarck, and *Fraxinus americana*, Linné (Nat. Ord. Oleaceæ). Forest trees of northern United States and Canada. *Dose*, 10 to 60 grains.

Common Names: 1. Black Ash, Elder-leaved Ash. 2. White Ash.

Principal Constituent.—A bitter alkaloid in minute quantity.

Preparation.—*Specific Medicine Fraxinus. Dose*, 10 to 60 drops.

Action and Therapy.—Probably of some value in uterine subinvolution, with pelvic heaviness and dragging pain, and soreness and headache at the vertex and occipital base of the skull. That it will cure uterine tumors, as has been claimed, is extremely doubtful and lacks sufficient proof to be given credence. Its relative, the White Ash, is said to be cathartic.

FUCUS.

The marine plant *Fucus vesiculosus*, Linné (Nat. Ord. Fucoideæ). A perennial seaweed.

Common Names: Bladder-wrack, Sea Wrack, Kelp-ware, Black-tang, etc.

Principal Constituents.—Sodium and potassium salts of *iodine*, bromine and chlorine.

Preparation.—*Specific Medicine Fucus. Dose*, 5 to 30 drops.

Action and Therapy.—Fucus, once exploited as a remedy for obesity, is no longer relied upon for that purpose. It has, however, alterative properties, probably due to the haloid elements it contains, and deserves study for its influence upon waste and nutrition. It is somewhat diuretic, and is believed to give tone to lax muscular fibers. Fatty degeneration of the heart has been benefited by it, and it relieves irritation and chronic inflammation of the bladder. Its power of lessening irritation and congestion has led to its successful use in acute desquamative nephritis. From 5 to 20 drops should be taken every 3 or 4 hours.

GALIUM.

The herb *Galium aparine*, Linné, and other species of Galium (Nat. Ord. Rubiaceæ). Common in moist grounds in Europe and the United States.

Common Names: Cleavers, Goose-Grass, Catch-Weed, Bedstraw.

Principal Constituents.—Rubichloric, gallitannic, and citric acids.

Preparations.—1. *Infusum Galii*, Infusion of Galium (℥j to Water, Oj). *Dose*, 1 to 4 fluidounces.

2. *Specific Medicine Galium. Dose*, 5 to 60 drops.

Specific Indications.—Dysuria and painful urination in febrile and inflammatory states; renal and cystic irritation with burning; "nodular growths or deposits in skin or mucous membranes" (Scudder).

Action and Therapy.—Galium is a useful refrigerant diuretic in fevers and inflammations, and to relieve dysuria with pain and scalding or burning in the urethra or neck of the bladder. It may be used as a sedative diuretic in scarlet fever. It is undoubtedly alterative and may be exhibited in scrofulous disorders, but has been unwisely claimed as a remedy for carcinomatous growths.

Galium tinctoria is aromatic and has been recommended in the spasmodic cough of asthma and chronic bronchitis. The best use for these drugs is as diuretics.

GALLA.

An excrescence on *Quercus infectoria*, Olivier, and other allied species of Quercus (Nat. Ord. Fagaceæ), caused by the punctures and deposited ova of the *Cynips tinctoria*, Hartig.

Common Names: Nutgall, Galls.

Principal Constituents.—Tannin (24 to 80 per cent) and gallic acid (1 1/2 per cent).

Preparations.—1. *Pulvis Gallæ*, Pulverized Galls. *Dose*, 5 to 20 grains.

2. *Unguentum Gallæ*, Ointment of Nutgall (20 per cent nutgall).

Action and Therapy.—Galls are astringent and owe this property to the large quantity of tannic acid they contain. As an internal medicine and largely for external purposes they have been supplanted by gallic and tannic acids, which see. Galls, however, are considered especially effective in hemorrhoids, being preferred by many as a local application, in ointment, in preference to the acids named. They are commonly associated with opium for the same purpose.

GAMBIR.

An extract prepared from the leaves and twigs of *Ourouparia Gambir* (Hunter), Baillon (Nat. Ord. Rubiaceæ). Sumatra, Ceylon, and countries bordering the Straits of Malacca. *Dose*, 1 to 30 grains.

Common Names: Gambir, Gambeer, Terra Japonica, Pale Catechu.

Description.—Irregular masses or cubes, reddish-brown, pale brownish-gray or light brown, friable, crystalline, and breaking with a dull earthy fracture, bitterish with sweetish after-taste, no odor and great astringency. *Dose*, 15 grains.

Principal Constituents.—*Catechutannic acid* (35 to 40 per cent) the active astringent; *catechin* (catechuic acid) probably inert; and *pyrocatechin*.

Preparations.—1. *Trochisci Gambir*, Troches of Gambir (Gambir about 1 grain, Sugar, Tragacanth, and Orange-flower Water).

2. *Tinctura Gambir Composita*, Compound Tincture of Gambir (Gambir and Cinnamon). *Dose*, 1 fluidrachm.

Action and Therapy.—*External.* Gambir is powerfully astringent. It restrains excessive discharges, overcomes relaxation and congestion, and checks local hemorrhages. Gambir is now used in place of catechu

(extract of wood of *Areca Catechu*) as it carries practically the same bodies in more available form, though it contains less tannin than that extract. It may be used in relaxed sore throat, relaxed uvula, and the relaxation and congestion of the fauces common to speakers and singers. A gargle or the troches may be employed. It is rarely used, by injection, in leucorrhœa, and in powder or tincture to control epistaxis. It is a good astringent for congested and spongy gums.

Internal. The powerfully astringent properties of gambir are utilized in the control of serous diarrhœas. If there is much mucus present a purge of castor oil is advised, to be followed by the gambir alone, or with camphorated tincture of opium. It is seldom used in modern Eclectic practice.

GAULTHERIA.

The leaves of *Gaultheria procumbens*, Linné (Nat. Ord. Ericaceæ). Damp woods and sandy soils of eastern third of the United States.

Common Names: Wintergreen, Teaberry, Mountain Tea, Boxberry.

Principal Constituents.—An aromatic volatile oil (*Oleum Gaultheriæ*); *arbutin*, *ericolin* and *urson*.

Preparations.—1. *Oleum Gaultheriæ*, Oil of Wintergreen. True Oil of Wintergreen; composed of about 96 per cent of methyl salicylate. *Dose*, 5 to 15 drops.

2. *Specific Medicine Gaultheria. Dose*, 5 to 20 drops.

3. *Spiritus Gaultheriæ*, Spirit of Gaultheria (Essence of Wintergreen—5 per cent of oil in alcohol). Chiefly a flavor essence.

Related Oil.—*Methylis Salicylas*, Methyl Salicylate or Artificial Oil of Wintergreen. This is prepared synthetically and sold under the name of Oil of Wintergreen. Its source must be stated on the label. It ranges from colorless to yellowish or reddish and has the odor and taste of wintergreen. *Dose*, 5 to 15 drops.

Specific Indications.—Irritation of the bladder and prostate gland; undue sexual excitement, and early stage of renal inflammation.

Action.—Oil of wintergreen has identically the same physiological action as salicylic acid except that in poisonous doses it is more certain to produce coma. The symptoms of toxic doses are drowsiness, cerebral congestion with throbbing of the carotids, delirium, contracted or dilated pupils, visual disturbances, tinnitus aurium, paresis, somnolence, and coma preceding death. Autopsy reveals congestion of the stomach, duodenum, and the kidneys.

Therapy.—*External.* Oil of wintergreen in full strength may be applied to carious teeth to relieve toothache. In full strength, or in suitable dilution with olive oil or cottonseed oil, it provides a good pain-relieving application for acute articular and chronic rheumatism and in gonorrhœal arthritis. If used very strong the skin may subsequently exfoliate. Applied to denuded surfaces it is readily absorbed and may produce toxic effects.

Embrocations containing oil of wintergreen are valuable for local inflammatory swellings, neuralgic pain, pleurodynia, myalgia, itching, and swelling and stiffness of the joints. The following are a few of many such liniments: (1) Oil of Gaultheria, fʒiij; Oil of Olive, q. s., fʒvj. Mix. (2) Oil of Gaultheria, fʒiij; Salicylic Acid, gr. xx; Alcohol, fʒij; Oil of Olive, q. s., fʒvj; Mix. Shake when used. Especially useful upon rheumatic joints. (3) Oil of Gaultheria, fʒiij; Chloroform Liniment, Soap Liniment, aa fʒij. Mix. Shake when used. For painful surfaces.

(4) Oil of Gaultheria, fℨij; Asepsin, gr. xv; Echafolta, Alcohol, aa, fℨijss. Mix. Valuable for application to cuts, bruises, and diluted with water as a mouth wash.

Internal. Specific Medicine Gaultheria, or an infusion (Leaves, ℨj to Water, Oj), has a specific action upon the urino-genital tract, relieving irritation and subacute inflammation. This action is especially exerted upon the neck of the bladder and in the prostatic urethra. It does not greatly increase the secretion of urine, but renders its voiding easier by alleviating the sphincteric irritation. It is, therefore, a remedy for dysuria. In incipient renal inflammation it sometimes does good, and in acute tubal nephritis it is asserted to have given benefit even where blood and tube casts are passed. Considerable good has been accomplished with it when spermatorrhœa and sexual excitement are caused by urethral irritability and prostatic fullness. The specific medicine may be administered in 5 to 15 drops doses in water 3 or 4 times a day. Some physicians have advised both gaultheria and its oil for the relief of hepatic congestion and in sluggish vascularity and engorgement of the intestinal glands, as well as to relieve hemorrhoids by overcoming congestion of the portal vessels.

Oil of gaultheria has aromatic and antiseptic properties. It consists most largely of methyl salicylate, over 90 parts at least, and is therefore analogous to salicylic acid and the salicylates in its effects. Large doses depress the heart just as the salicylates do; large doses also cause nausea and vomiting. Used within bounds, short of sufficient to induce gastric derangement, it is very useful where an anti-rheumatic is demanded and in cystic disorders with putrescent urine. Too long continued, however, it may induce renal irritation, and this must be carefully guarded against. Urine that was ammoniacal and putrescent a few hours after passage has been followed, after the administration of twenty drops of the oil, by an output that remained free from putrefaction for twelve days. One part of the oil in about two hundred of urine has preserved the latter from change for eighteen days. Hence the value of this oil in cystitis with putrescent urine. While few agents should be administered with digitalis, oil of wintergreen is a grateful adjuvant and does not impair the usefulness of the foxglove. If for any reason sodium salicylate disagrees with rheumatic patients, oil of wintergreen, which is less likely to contain deleterious by-products, may be given. It is useful in all types of acute rheumatism in which salicylic acid or the salicylates are effective. Those most benefited are the acute inflammatory rheumatism and so-called gonorrhœal rheumatism, a specific gonorrhœal arthritic infection. Small doses have relieved facial neuralgia and tic douloureux; and sometimes it exerts a soothing and antiseptic effect in acute gonorrhœa. The oil may be administered in olive oil or in the form of the spirit (essence) mixed with sweetened water.

The essence is of service in dry, persistent bronchial cough, and the specific medicine in cough with considerable bronchial secretion. It is also useful in the colic of infants.

Gaultheria is an agent of special value as a flavoring agent and preservative for water-dispensed medicines in the summer season. For this purpose it should be widely used. The spirit (50 parts of oil of gaultheria to 950 parts of alcohol) is the preferred form for this purpose.

GELATINUM.

Gelatin.

A purified glue prepared by boiling gelatinous animal tissues in water and purifying, evaporating and drying the product.

Description.—A non-crystalline solid in sheets, flakes, shreds, or powder; without color or slightly yellowish, and having a feeble characteristic taste. Unalterable in dry air, but readily decomposes when moist or in solution. Insoluble in alcohol, fixed or volatile oils, ether, chloroform or cold water, but swelling and softening in the latter, 5 to 10 per cent of which it absorbs; soluble in hot water, glycerin, and acetic acid. It is largely employed in making gelatin capsules for the tasteless administration of medicines.

Preparation.—*Gelatinum Glycerinatum*, Glycerinated Gelatin.

Action and Therapy.—Styptic and protective. Gelatin may be used in the treatment of some forms of eczema and nasal catarrh; and as a soothing protective in rectal affections. It enters into the pharmacal preparation of capsules, lozenges, wafers, suppositories, court plasters, and as a coating for pills. Its intravenous or hypodermoclytic use (of about 3 ounces of a 1 per cent sterile solution) to increase blood coagulation in aneurism or hemorrhage is less in favor than formerly, now that coagulin and similar ready prepared biological preparations are available.

Internal. Gelatin is demulcent and may therefore be used as a lenitive after cases of irritative poisoning. While having some antidotal power over iodine and bromine and the alums, it is undesirable on account of the length of time required to prepare it properly for use. As a proteid food it is prepared largely in various ways for feeding the sick, and owing to its freedom from the formation of indol it has been advised as a part of the diet in intestinal putrefaction showing marked indicanuria.

GELSEMIUM.

The dried rhizome and roots of *Gelsemium sempervirens* (Linné), Aiton (Nat. Ord. Loganiaceæ). *Dose*, 1/10 to 1 grain.

Common Names: Yellow Jasmine, Yellow Jessamine, Carolina Jasmin.

Principal Constituents.—Two bitter alkaloids—crystallizable *gelsemine*, the paralyzing agent, and amorphous *gelseminine*, a very toxic and tetanizing principle, and a volatile oil. There is also present *gelseminic acid* (*beta-methyl-æsculetin*).

Preparation.—*Specific Medicine Gelsemium. Dose*, 1/10 to 10 drops. *Usual method of administration:* ℞ Specific Medicine Gelsemium, gtt.x to ʒj; Water, q. s., fl℥iv. Mix. Sig.: One teaspoonful every 1 to 3 hours.

Specific Indications.—*Hyperæmia;* bright eyes, contracted pupils, great heat, and nervous unrest; mental irritability; insomnia, with nervous excitation; pain over the whole head; tremulousness, with great nervous excitement and high temperature; irritation of urinary tract; dysuria, with scant secretion of urine; arterial throbbing, with exalted sensibility; pinched, contracted tissues; convulsions, with hyperæmia; thin, dry, unyielding os uteri, with dry and hot vaginal walls.

Action.—Gelsemium acts chiefly upon the spinal cord, first impressing the sensory tract, even to the extent of producing complete anæsthesia; later, its dominant action occurs, that of expending its force on the motor neurons, causing paralysis of motion. Sometimes this sequence is reversed. Upon the higher brain it has but slight effect, but upon the motor filaments of the nerves of the head, particularly the third and sixth cranial pairs, its action is profound. This is well shown by the resultant palpebral ptosis and relaxation of the jaw. Respiration is first stimulated, then

depressed. Moderate doses do not appreciably disturb the circulation. Toxic doses, however, depress both the pulse rate and the blood pressure. In man convulsions do not occur. Both gelsemium and gelsemine, when dropped into the eye, cause violent dilation of the pupil, with accompanying paralysis of accommodation. The mydriasis is not so lasting as that from atropine. Gelsemium is quickly absorbed and spends its force in about three hours. The alkaloid gelsemine, correspondingly more active, is eliminated unchanged by way of the kidneys. Death from gelsemium is due to asphyxia. Gelsemium does not affect all human beings alike, some being but slightly influenced by it while others are profoundly impressed. The smallest active doses (ranging from 5 to 15 minims of the specific medicine or fluidextract, according to susceptibility) occasion a languid sense of ease and slight lowering of the force and frequency of the pulse. Larger doses induce a desire to lie down, and cause vertigo, disturbed sight, and sometimes orbital pain. Continued small doses may, after several hours, provoke vomiting; otherwise it has little or no effect upon the stomach or bowels.

Toxicology.—Toxic doses produce extreme muscular relaxation and prostration, double vision (sometimes blindness), widely dilated and immovable pupils, internal squint, and the eyelids droop and are raised with difficulty, or complete paralytic palpebral ptosis occurs. Often the patient sinks in his tracks, or if he stands he staggers. Sensibility is greatly impaired, the jaws drop and speech fails. Breathing becomes slow, labored, and shallow; the pulse rapid, weak, and thready; the skin is wet with cold sweat, and the body-heat markedly depressed. Drowsiness may be felt, but consciousness is usually retained until just before death, evidence that the higher cerebral centers are but slightly involved. Death takes place from centric respiratory paralysis, and almost simultaneous arrest of the action of the heart.

The cardinal symptoms of poisoning by Gelsemium, therefore, are *ptosis, diplopia, dropping of the lower jaw*, and *absolute muscular prostration.*

In poisoning by gelsemium or its alkaloids, the emetic or stomach pump should be used if the patient is not too weak. Tannic acid (or strong infusion of store tea) should be administered, external heat applied, and artificial respiration attempted as soon as breathing shows signs of failure. Stimulation of the respiratory function should be enforced by the hypodermatic use of atropine, and that of the heart by ammonia, ether, alcohol and digitalis, the first three in the order named, to sustain the organ until the digitalis, which should be given at once, can act.

It has been asserted that morphine completely antidotes the poisonous effects of gelsemium. As gelsemium poisoning is quite rare the antidotal treatment is none too well established and is, therefore, based mostly on general principles.

Therapy.—Gelsemium is primarily the remedy for *acute hyperæmia of the brain and spinal centers.* All through the woof and warp of its therapy runs the thread of nervous excitation and unrest; and often fever, spasm, and pain. In proper doses it relaxes high nervous and muscular tension. By diminishing the velocity of the blood current to the head and spinal

tract it prevents spasmodic action. It is, therefore, a remedy for hyperæmia; never a remedy for congestion. It is the specific agent for relief in the nervously excited and highly feverish state, for the child with hot head and tremulous and jerky muscles, for great restlessness with elevation of temperature; for the touchy and grouchy but feverish individual who magnifies his ailments; and for those who dread even the simple ordeals and trials of life. The most direct indication for its employment is *exaltation of nervous function*. It is contraindicated by a weak heart and feeble circulation. As an antispasmodic it stands unrivaled save by lobelia and bromide of potassium, with both of which it acts kindly and harmoniously. "The flushed face, bright eye, contracted pupil, increased heat of head, great restlessness and excitation" are the classic indications for it as first formulated by Scudder, and these stand among the truest of specific guides ever recorded for the use of a medicine.

Though not classed as an antipyretic, gelsemium softens blood pressure, slowly reduces the pulse, and overcomes hyperæmia associated with exalted nervous action, thus making it indispensable in some kinds of inflammation and fevers. This period of excitement usually obtains early in the febrile state. When this nervous tension has been relieved by the drug, then its usefulness is practically at an end. To continue with it would imperil the integrity of the heart, which, while apparently but little affected during health, appears to be readily endangered by it during the advanced stages of febrile process. Only in sthenic fevers is it indicated; never when the heart is weak or degenerate or the patient is prostrated by debility. A soft, open pulse, moist skin, cleaning moist tongue and nerve calm being essential to the effective use of quinine, gelsemium is administered in the febrile stage of malarial or intermittent fevers to produce these effects and prepare the way for the kindly action of that great antiperiodic. This it does with directness and dispatch. Even before this preparatory use gelsemium alone was employed in these diseases with asserted success by early Eclectic practitioners, and in doses which we of to-day would hesitate to administer. In other forms of fever, as remittent and so-called bilious types, which tip the balance one way or the other toward malarial fever or typhoid fever, the drug is efficient if the indications above noted are strictly observed. For the febricula of children, with great and tremulous agitation, high fever, headache, and near spasmodic explosiveness, it is unsurpassed both to allay the fever and to give rest and sleep. Scudder remarks that in fevers "we find many times that its influence is very decided; it causes relaxation of the system; the pulse is less frequent and softer; the respiration is slower; the skin becomes cooler, soft and moist; there is less determination of blood to the head, and if there is pain in it, it is reduced or entirely ceases, while at the same time we frequently notice an increased secretion of urine." In typhoid or enteric fever its use should be more guarded. When of the robust type with vigorous onset, it is serviceable if used early, but when the slightest evidence of enfeeblement of the heart or disintegration of the blood is apparent it should be withheld at once. Under such circumstances we have seen a rapidly dicrotic and irregular pulse and prostration ensue, even though but small doses were being administered. By no certain means can this result be wholly attributed to the drug, yet surely the stage

for gelsemium medication has then passed. In puerperal fever it is useful as long as exalted nervous tension calls for it.

As stated gelsemium is a remedy of marked usefulness in the sthenic fevers of childhood. The more these tend to convulsive complications the stronger becomes the indication for this agent. Infants, however, are quite susceptible to the drug and the dose for them should be minute—even fractional. In inflammatory bowel disorders of children, particularly during dentition, it is one of our most direct medicines, and is then most potent in enteritis, gastro-enteritis, cholera infantum, and diarrhœa and dysentery, both with tenesmus—all of which derangements are so often the blight of the child's second summer. Here the direct guide will be the exalted nervous tension, the increased heat of head and body, the brilliant, shifty eyes, great restlessness, and the near explosive state. If convulsions occur, then larger doses will control the spasms.

Observing the indications undeviatingly gelsemium will be found one of the best remedies for the spasms of childhood, or infantile convulsions. Though single remedies are preferred in Eclectic practice, the following combination is the most effectual we have used for such attacks: ℞ Specific Medicine Gelsemium; Specific Medicine Lobelia, aa, fl℥j; Potassium Bromide, ℥j; Water q.s. fl℥iv. Mix. Sig.: One teaspoonful every five minutes until the spasms cease. Then administer one teaspoonful of the solution every two hours for one or two days. The bowels should be thoroughly emptied by a copious enema of soapy water and the child immersed in a warm bath (tested by the attendant's bare elbow), with a cold pack to the head. If the convulsions are due to gastro-intestinal abuse, the spasms are soon controlled; if they are the precursors of infectious or other diseases, and centric in origin, an advantage will have been gained by the early use of the gelsemium.

Gelsemium is an important sedative in the early stage of acute bronchitis, broncho-pneumonia, lobar-pneumonia, and pleurisy. In pneumonia it is less often required than veratrum, but in all acute respiratory inflammations, of a sthenic type, it may be required to meet the nervous manifestations and to give rest. In acute febrile and inflammatory diseases it is frequently effective in quieting delirium and overcoming insomnia. This is particularly evident in la grippe. Of the few remedies that offer any therapeutic hope in acute cerebro-spinal meningitis and acute poliomyelitis gelsemium has been favorably considered. Its administration should not be continued in the former when effusion takes place, nor in the latter when paralysis is established.

Gelsemium is a remedy for pain, provided it is dependent upon or associated with nervous tension. For pain in the weak and apathetic it has no value. It has fully justified its reputation in simple neuritis and various types of neuralgia when there is hyperæmia, nervous irritability and sharp, muscular twitching. Under these conditions it may be used in intercostal neuralgia (often the precursor of herpes zoster), ovarian neuralgia, and is sometimes effectual in sciatic neuritis or neuralgia, though too much reliance must not be placed upon it in this affection. If sciatic and other forms of neuritis are purely nervous and hyperæmic, it is most likely to be of service, but if dependent upon sugar toxæmia, pressure, injury,

loaded cæcum, or pelvic sublaxation, other measures must be resorted to. The best results from gelsemium in neuralgia are obtained in trigeminal or facial neuralgia, dependent upon cold, dental caries, or peridental inflammation. Toothache in apparently sound teeth, but with violent throbbing from active circulation, frequently yields to this drug. Liberal doses of gelsemium are required to ease neuralgic pain. It gives relief in recent tic douloureux with active circulation in the head, but when the Gasserian ganglion becomes permanently impaired it fails, as do other medicines. Surgical relief is then the only rational procedure. In acute inflammatory rheumatism gelsemium is serviceable chiefly to allay excitement and to some extent alleviate the pain. It is adapted only to the initial stage and when sthenic conditions prevail, and then only as an aid to the more direct antirheumatic remedies. It is one of the commonest and best remedies for myalgia due to the strain of muscular exertion, or to recent colds from exposure to inclement weather.

Various forms of headache yield to gelsemium. It is best adapted to nervous headache with active circulation and throbbing pain. Occasionally it serves well in migraine, but is less effectual than the synthetic analgesics. It is more efficient when headache is caused by eye-strain.

Limited to the indications of nervous excitement with increased vascularity and spasmodic or colicky pain, gelsemium is of very great utility in dysmenorrhœa in robust subjects, as it is also in so-called uterine colic. Full doses are required. It acts favorably, when similarly indicated, in ovaritis and metritis, and in salpingitis before suppuration sets in; after that it is of no other value than to quiet the nervous phenomena.

Scanty urine, with hyperæmic irritation of the renal organs and urinary passages, is a direct indication for gelsemium. It should then be given preceding or with the desired diuretics. Renal suppression is then promptly relieved by it, but not when there is congestion, for which belladonna is far more effectual. For the dysuria of spasmodic urethral stricture it is *the* remedy. It allays the irritation and temperature excited by the passage of catheters, bougies, and divulsors. We rely upon it in cystic irritation from cold when the urging to pass urine is frequent and the passage difficult. For this purpose, together with apis or eryngium, it gives the happiest results in this annoying complaint in women. It may also be satisfactorily employed for suppression of urine in hysterical women. In acute nephritis it is one of the surest remedies, and is just as serviceable in acute cystitis when due to colds and not dependent upon the retention of putrid urine. Its relaxant powers sometimes facilitate the passage of small renal calculi and cystic gravel.

In the inflammatory stage of gonorrhœa no agent is more salutary than gelsemium. It prevents and relieves chordee, eases urination, and gives comfort when burning and irritation are pronounced. For this purpose it may well be combined with cannabis and aconite as follows: ℞ Specific Medicine Gelsemium, fl℥j; Specific Medicine Aconite, gtt. x; Specific Medicine Cannabis, fl℥j; Water, q. s., fl℥iv. Mix. Sig.: One teaspoonful every two or three hours.

Obstetric therapy would be impoverished without gelsemium. One should not be reckless with it, however, as many believe that it favors hemorrhage. Our experience does not verify this view. It is *the* remedy to relax rigid os when the rim is thin and unyielding, holding the head as in a vise, and there is dryness of the parturient canal. It very promptly removes this impediment, favors normal secretion, and facilitates labor. In fact, all sphincters acutely contracted are relaxed by full doses of gelsemium. During labor it is most valuable to overcome the great restlessness, fear, and excitement experienced by nervous women, and by its calmative power rectifies jerky and ineffectual contractions. It also mitigates the severity of the pain and relieves the sense of heat and dryness complained of by the patient. Indeed, this is one of the most praiseworthy effects of this drug. It also controls after-pains and the nervous agitation that follow a few days after parturition. For puerperal convulsions it is inferior only to veratrum and shares with this drug and morphine and chloroform in being the most generally effective remedies in this form of eclampsia. In no way does it interfere with the recently introduced Fischer's alkaline intravenous treatment.

GENTIANA.

The dried rhizome and roots of *Gentiana lutea*, Linné (Nat. Ord. Gentianaceæ). Common in the mountainous regions of southern and central Europe. *Dose*, 10 to 30 grains.

Common Names: Gentian; Gentian Root.

Principal Constituents.—*Gentiopicrin*, an active, bitter glucoside, associated with gentisic acid or gentisin ($C_{14}H_{10}O_5$). No tannin is present but a coloring matter which is darkened by iron compounds.

Preparations.—1. *Infusum Gentianæ*, Infusion of Gentian. *Dose*, 1 fluidrachm to 1 fluidounce.

2. *Specific Medicine Gentiana*. *Dose*, 5 to 30 drops.

3. *Tinctura Gentianæ Composita*, Compound Tincture of Gentian. (Contains Gentian 10 per cent, Bitter Orange Peel, and Cardamon.) *Dose*, f℥ss to f℥j.

Specific Indications.—Sense of epigastric depression, with physical and mental weariness; atony of stomach and bowels, with imperfect digestion.

Action and Therapy.—Gentian is one of the best of the simple bitter tonics, for the action of which compare *Calumba*. In large doses, however, it is capable of deranging digestion, with the production of nausea, vomiting, and diarrhœa, and fullness of the pulse, with headache. It is contraindicated in gastric irritability or inflammation.

The chief use of gentian is to promote the appetite and improve digestion in states of chronic debility. This it does when given in moderate doses. For atony of the stomach and bowels, with feeble or slow digestion, it is an ideal stimulating tonic; and after prolonged fevers and infections, when the forces of life are greatly depressed and recovery depends upon increased power to assimilate foods, gentian may be used to improve gastric digestion and thus hasten the convalescence. Gentian is especially useful in anorexia, in the dyspepsia of malarial origin, and in subacute gastritis and intestinal catarrh. The infusion and the compound tincture of gentian may be used alone or as vehicles for other medicines.

GERANIUM.

The rhizome of *Geranium maculatum*, Linné (Nat. Ord. Geraniaceæ). Common in the rich soils of woods and low grounds in the United States. *Dose*, 5 to 60 grains.

Common Names: Cranesbill, Wild Cranesbill, Crowfoot, Spotted Geranium.

Principal Constituents.—*Tannin* (10 to 28 per cent, according to season) and *gallic acid* (in dried root).

Preparations.—1. *Decoctum Geranii*, Decoction of Geranium (℥ss to Water, Oj). *Dose*, 1 to 2 fluidounces.

2. *Specific Medicine Geranium*. *Dose*, 5 to 60 drops.

Specific Indications.—Relaxed mucous tissues with profuse debilitating discharges; chronic mucous diarrhœas; chronic dysentery; diarrhœa with constant desire to defecate; passive hemorrhages; gastric ulcer.

Action and Therapy.—Geranium is one of the simple and much neglected of the early Eclectic medicines. It is an ideal astringent and for conditions requiring such an action it is preferable to many other constringing drugs. Geranium is indicated in subacute and chronic bowel disorders when the evacuations are abundant and debilitating. It is especially adapted to relaxation of the mucosa following inflammation. For the summer diarrhœas of older children, and especially the cholera infantum of infants, it is splendidly effective after the bowels have been thoroughly cleansed of undigested and decomposed contents. For infantile use we prefer the decoction in milk. If that does not agree, small doses of the specific medicine in water may be employed. When dysentery tends to chronicity, the thorough use of magnesium sulphate followed by geranium will render good service.

Geranium is of some value in passive hemorrhages, as hæmaturia, hemoptysis, and menorrhagia. It is only useful in the first two when the blood lost is small in amount, and in the latter when bleeding is prolonged, but merely oozing. Though a useful agent in relaxed conditions with catarrhal discharges other than those of the bowels, as chronic pharyngeal catarrh, relaxed uvula, leucorrhœa, etc., it is no more valuable than other tannin-bearing drugs, and is often inferior to tannic acid itself.

Geranium is of specific value where long saturation of the mucosa with unhealthy catarrhal secretions favor a tendency to destruction of tissue. We have found it to quickly cure aphthous ulceration of the mouth attended by gastric acidity and acid diarrhœa. For gastric ulcer it is one of the best therapeutic means we possess. Geranium, hydrastis, mangifera, bismuth subnitrate and mangesium oxide, singly, or in indicated association, have proven the most effective agents in our experience for the medicinal relief of curable cases. They restrain hypersecretion, correct excessive acidity, check hemorrhage, and relieve pain; sometimes healing appears to progress rapidly under their influence.

GLUCOSUM.

Glucose, Liquid Glucose, Syrupy Glucose.

A syrupy liquid, composed chiefly of dextrose (dextro-glucose) and dextrin. It is obtained by the incomplete hydrolysis of starch.

Description.—An odorless or nearly odorless, sweet, syrupy liquid, of a little or no color. It is sparingly dissolved by alcohol, but water dissolves it freely, the aqueous solution being neutral or slightly acid to litmus paper *Dose*, 2 to 6 fluidounces of 6 to 30 per cent solutions of glucose.

Specific Indications.—Shock; acidosis.

Action and Therapy.—Glucose is an easily digested nutrient, fermentable, and comparing in food value closely to sugar. Diuretic properties have been ascribed to it, and it is said to protect against fatty degeneration produced by the administration of general anæsthetics. Glucose, in 6 to 10 per cent solutions, has proved serviceable, given by enteroclysis, in dropsical effusions, provided the kidneys are not badly damaged, and in uræmic eclampsias, and other affections with faulty elimination of urine. Intravenously administered, in solutions of 10 to 30 per cent, it has been very successful in surgical shock. One of its most important fields of usefulness is in infant feeding (2 to 3 fluidounces of 6 per cent solution per rectum), and in the same strength solution (6 ounces) intraperitoneally to prevent acidosis in malnourished infants. Acetone quickly disappears under such use of it.

GLYCERINUM.

Glycerin, Glycerol.

A liquid composed most largely of a trihydric alcohol ($C_3H_5(OH)_3$) obtained by the processes of hydrolysis and distillation of fats, both animal and vegetable, or of fixed oils.

Description.—A thick, syrupy, colorless liquid having a sweet and warming taste and a faint but agreeable odor. It has a great avidity for moisture, becoming appreciably thinner upon long exposure to the atmosphere. It mixes with water or alcohol; and is insoluble in ether, chloroform, and fixed and essential oils. *Dose*, 1/2 to 2 fluidrachms.

Preparation.—*Suppositoria Glycerini*, Suppositories of Glycerin.

Action.—Glycerin is a powerful hygroscopic. So great is its avidity for water that it will readily abstract moisture from the tissues to which it is applied. It is also slightly irritant to the skin and mucous surfaces, and considerably so to abraded surfaces. The discomfort quickly subsides, however, and it then acts as an antiseptic and protective emollient to the skin. It is a demulcent to mucous tissues. Applied to the rectum it provokes evacuation, both by its irritating and dehydrating effects. Glycerin kills parasites, both cutaneous and intestinal, and allays itching, probably by its protective, antiseptic, and hygroscopic powers. Glycerin is rapidly absorbed by the intestines and is mostly oxidized in the body. By some it is thought to be, in some measure at least, a food, and indirectly a conservator of fats through its effects of increasing the non-nitrogenous reserve of the body. It is also believed to increase energy. Upon the glycogenic function its effects are still in doubt, many contending that it reduces the sugar when in excess in the body. Glycerin is laxative and in very large amounts acts not unlike alcohol, producing a similar intoxication and like gastric effects. It is also said to favor the elimination of uric acid.

Therapy.—*External.* The bland and practically unirritating character of pure glycerin, in the presence of a little water, its permanence when exposed to the air (except absorption of moisture), and the completeness with which it shields the parts make it the most largely used external application in a great variety of local disorders. Its protective unctuousness without being greasy, its splendid and extensive solvent powers, its ability to hold in close contact to the tissues powders and other medicines that would dry and fall off if applied with alcohol or water, its antiseptic and emollient properties, and its antipruritic qualities, make it an indispensable vehicle. It is freely miscible with water and most ointment bases, and dissolves or

holds in suspension the most commonly used external medicines. It should never be applied full strength, however, except where its dehydrating effects chiefly are desired. Through its great greed for water it readily removes moisture from the tissues, leaving them hardened and more likely to crack. A little water should be added to it for local use, or the parts may be moistened and left wet before its application. Only pure glycerin should be used.

Equal parts of glycerin and water, or preferably rose water, form an elegant and emollient cosmetic lotion for chapped hands, lips, and face, cracked or sore nipples, excoriated and chafed surfaces, and swollen hemorrhoids. A few grains of borax sometimes add to its efficiency. Compound tincture of benzoin and glycerin is also a pleasant application. For those exposed to winds and storms, and who have their hands much in water, the following is splendidly effective: ℞ Glycerin, fl℥ij; Carbolic Acid, gr. x; Tincture of Arnica Flowers, fl℥ss; Rose Water, q. s., ℥iv. Mix. Sig.: Apply after thoroughly washing and rinsing the hands, and while they are still wet. Sometimes lobelia may be used in place of the arnica.

Glycerin, added to poultices, renders them soothing and keeps them moist. It forms a good application to boils, carbuncles, small abscesses, and to local œdemas, as of the prepuce. Here it may be used pure for its antiseptic and dehydrating effects. Mixed with alcohol (1 part), glycerin (3 parts), it makes a useful and "drawing" application for boils, and an antiseptic stimulant for foul ulcerations. A mixture of glycerin and water in proportions to suit the case may be used as a toilet wash for the mouth in fevers, to keep the tongue and lips soft and pliable, and to remove sordes and other viscous secretions. It also reduces the thirst occasioned by the dryness of the mouth.

Glycerin may be used as a vehicle for lime water for application to small burns, erythema, and slight excoriations; for menthol for the relief of itching in urticaria, chronic eczema, and other pruritic conditions; for boric acid in the mild forms of facial dermatitis; for lactic acid in freckles, sunburn, and other pigmentations; for bismuth, borax, salicylic acid, phenol, boric acid, or sodium or potassium bicarbonate when their long-continued local effects are desired, especially in ulcerations and various skin diseases. A small portion of liquor potassæ (1/2 per cent) may be added to it for use upon rough skin and in chronic eczema. Among the skin disorders in which it is especially useful as a vehicle may be mentioned impetigo, lichen, porrigo, psoriasis, pityriasis, herpes, and tinea versicolor (with mercuric chloride) and other parasitic affections.

Glycerin (diluted) is one of the best agents to soften hardened and impacted cerumen prior to removing it by gently syringing with warm water. Any irritation caused by the hardened mass or the means of removal may be overcome by the following: ℞ Colorless Hydrastis (Lloyd's), fl℥j; Glycerin, gtt. xx; Distillate of Hamamelis, q. s., fl℥ss. Mix. Sig.: Apply warm to the parts by means of cotton. Glycerin is sometimes useful in otorrhœa. A 5 per cent solution of phenol in glycerin upon cotton may be used for insertion into the aural canal after rupture of the membrana tympani when tenderness around the ear persists. It acts by dehydration, reducing the swelling and facilitating a more complete drainage from the middle ear.

Either glycerin or the glycerite of boro-glycerin are favorite agents for the depletion of the tissues in congestive and subacute inflammation of the womb.

It should be applied upon tampons so as to remain in contact for several hours, and then be followed by a hot (not warm) douche. The same treatment gives good results in uterine subinvolution. A small quantity of pure glycerin, or the glycerin suppository, is very effective in provoking a movement of the bowels when the feces are below the sigmoid flexure. For a small child it is one of the most effectual methods for overcoming constipation, with lack of rectal response to the calls of nature. Care should he had to see that the syringe tip is perfectly smooth, and any irritation caused by the glycerin may be due to using the enema too frequently or to the use of an impure glycerin. As a rule, 1/2 drachm properly and carefully injected is followed at once by a fecal evacuation. Diluted glycerin is sometimes useful to prevent bed-sores.

Glycerite of Starch is a useful application in ichthyosis, and glycerin pastes are more cleanly and effective than those made with petrolatum or fats. Montgomery advises a paste made as follows: Starch, Zinc Oxide, of each 1 part; Glycerin, 2 parts. Prepare without boiling. This forms a white paste of paint-like consistence, adherent, non-greasy and pliable, and may be applied by spreading with the hand. It holds the parts like a splint, allowing discharges free egress, while it does not interfere with the natural secretions. It is especially designed for papular skin eruptions.

A large proportion of the good derived from the magma-poultices, such as "Antiphlogistine", etc., are due to the antiseptic and dehydrating qualities of the glycerin they contain.

Internal. Only pure glycerin should be used for internal use. Glycerin is invaluable as a flavoring and sweetening preservative for water-dispensed medicines. Especially is it demanded in the summer season. From 1 to 2 drachms are sufficient for most four-ounce mixtures, depending somewhat upon the quantity of alcohol or other preservative agents present. In special cases of diabetes it may be used as a substitute for sugars. While somewhat laxative it is seldom so used in Eclectic practice, and if selected would be indicated only where either constipation or diarrhœa is dependent upon fermentative changes. There are, however, cases of hemorrhoids, both bleeding and non-bleeding, in which it may be used as a laxative; and these are accompanied by fermentative action in the stomach and bowels. Glycerin is sometimes useful in fermentative dyspepsia, with flatulence and constipation, relieving largely by its antiseptic and dehydrating effects. Glycerin, well diluted with iced water, makes a fairly good drink for low forms of fever, where putrefaction is shown by the dry tongue, foul breath and sordes. Its value as a nutritional measure, in place of cod-liver oil and other fats, is open to grave doubt, with the probabilities in favor of its uselessness. Its employment as a food for diabetics, and in phthisis and other wasting diseases, has practically lost prestige, though in the first named many believe it useful to check, in some degree at least, the excretion of sugar. The common custom of taking glycerin, rock candy, and whisky for common coughs and colds is nothing less than a popular form of mild alcoholic tippling.

GLYCYRRHIZA.

The dried rhizome and roots of *Glycyrrhiza glabra typica*, Regel et Herder (Spanish Licorice), or of *Glycyrrhiza glabra glandulifera*, Regel et Herder (Russian Licorice), (Nat. Ord. Leguminosæ). Southern Europe and western Asia; cultivated. *Dose*, 5 to 60 grains.

Common Names: Licorice, Licorice Root, (1) Spanish Licorice Root, (2) Russian Licorice Root.

Principal Constituents.—The sweet glucoside *glycyrrhizin* ($C_{24}H_{36}O_9$), *asparagin*, *glycyramarin* and an acid resin.

Preparations.—1. *Specific Medicine Glycyrrhiza. Dose*, 5 to 60 drops.
2. *Fluidextractum Glycyrrhizæ*, Fluidextract of Glycyrrhiza. *Dose*, 30 drops.

Derivative: *Glycyrrhizinum Ammoniatum*, Ammoniated Glycyrrhizin. Very sweet, odorless, dark-brown or red-brown scales; soluble in alcohol or water. It is derived from glycyrrhiza and combined with ammonia. *Dose*, 1 to 8 grains.

Action and Therapy.—Glycyrrhiza root is demulcent, laxative, and expectorant. It acts upon mucous surfaces, lessening irritation and relieving coughs, catarrhs, and irritation of the urinary tract. The powdered extract is sometimes used to give solidity to pills, and the powdered root as a dusting powder for the same. The fluidextract is an agreeable flavoring agent for other medicines and soothing to irritated bronchial surfaces. The bitterness of cascara, quinine, aloes, quassia, the acridity of senega, guaiac, and the taste of ammonium chloride and sodium salicylate are more or less masked by the fluidextract. Licorice root is an ingredient of *Compound Licorice Powder.* (See *Senna*).

GOSSYPIUM.

The bark of the root and the hairs of the seed of *Gossypium herbaceum*, Linné, and of other species of *Gossypium* (Nat. Ord. Malvaceæ). An Asiatic plant extensively cultivated, especially in southern United States. *Dose*, 5 to 60 grains.

Common Names: (1) Cotton-Root Bark; (2) Cotton, Cotton Wool.

Principal Constituents.—The root-bark yields a red resin called *gossypic acid* (8 per cent) and volatile oil and tannin.

Preparations.—1. *Specific Medicine Gossypium. Dose*, 5 to 60 drops.
2. *Gossypium Purificatum*, Purified Cotton (Absorbent Cotton). (Cotton freed from impurities and deprived of fatty matter.)
3. *Oleum Gossypii Seminis*, Cottonseed Oil. A pale, yellow, odorless or nearly odorless oil, having a bland taste; slightly dissolved by alcohol and miscible with ether, chloroform, petroleum, and benzin. *Dose*, 1/2 to 2 fluidounces.

Specific Indications.—(Uterine inertia; preparations of fresh root-bark—large doses.) Tardy menstruation with backache and dragging pelvic pain; fullness and weight in the bladder, with difficult micturition; sexual lassitude with anemia; hysteria, with pelvic atony and anemia.

Action and Therapy.—*External.* Absorbent cotton is of mechanical use only in practice. A cotton jacket is preferred by many to poultices and magmas for use in acute lung diseases. It maintains an even protection from changes of temperature, and slight moisture usually accumulates under it, thus making it serve the purpose, without the weight and dangers, of the poultice. Cotton is widely used in surgical practice for sponging and dressings, to take up secretions, to protect painful surfaces in burns and scalds, and to prevent the ingress of atmospheric microbic invasion. It is a comforting application to rheumatic joints, usually being applied over some oleaginous application. Upon raw surfaces oils or some lubricant should be first applied and then the parts encased in cotton. If allowed to become stiff and hard it acts as any other foreign body. Cotton is used for

vaginal tampons, but they should be removed after a few hours use, as they become exceedingly foul and veritable hotbeds of infection. For packing wounds and cavities and similar surgical uses gauze is preferred to cotton. Cotton is a good medium by which to apply antiseptic and dusting powders.

Internal. Fresh cotton-root bark is emmenagogue. It is useful in tardy menstruation, with much backache and dragging pelvic pain. Owing to its undoubted power upon the uterine musculature it is of value in uterine subinvolution and is asserted to have reduced the size of fibroids. It probably acts much in the same manner as ergot, though far less powerfully. It has the advantage, however, of being practically non-poisonous. In uterine inertia during labor it is said to act well, though it is seldom brought into requisition. The reputed use of the decoction as an abortifacient by the cotton-district negresses is common knowledge. Fortunately the fresh root is not everywhere available, if it really possesses ecbolic properties, for old bark is said to be valueless for any purpose.

Webster employs gossypium in hysteria in children and adults. He reports it efficient in screaming children, morose women, and girls with uncontrollable laughter, as well as in those assuming muscular rigidity. These adult cases undoubtedly depend upon menstrual derangements.

Cotton Seed Oil. This is a bland, nutritious, and wholesome digestible oil, used as a food and emollient; and employed in pharmacy, medicine, and surgery for many of the purposes for which olive oil is used. (See *Oleum Olivæ.*)

GRANATUM.

The dried bark of the stems and roots of *Punica Granatum*, Linné (Nat. Ord. Punicaceæ). India, southwestern Asia, and the Mediterranean shores; naturalized and cultivated in warm latitudes. *Dose*, 30 grains.

Common Names: Pomegranate, Pomegranate Root Bark.

Principal Constituents.—*Pelletierine* or *punicine* (1/2 per cent), methyl-, pseudo-, and isopelletierine, all alkaloids, and punico-tannic acid (20 per cent).

Preparations.—1. *Pelletierinæ Tannas*, Pelletierine Tannate. (Contains in varying proportions, in admixture, the four alkaloids mentioned above.) A pale-yellow, non-crystalline powder, without odor, and an astringent taste. Soluble in alcohol and less readily in water. *Dose*, 4 grains.

2. *Decoctum Granati*, Decoction of Pomegranate Bark (see below).

Specific Indications.—Tæniacide and tæniafuge for the destruction and expulsion of tapeworm.

Action.—Pomegranate preparations, in large doses, causes nausea and vomiting, flatulence and intestinal pain. Notwithstanding the large amount of tannin it contains, such action is frequently followed by diarrhœa. Other effects are tremors, muscular weakness, and cramps in the extremities, dizziness, mental confusion, drowsiness, diplopia and mydriasis, and other ocular disturbances. The tannate kills the tapeworm easily, but has far less effect upon other intestinal parasites. The associated alkaloids, sold as pelletierine, constitute an exceedingly active combination, capable of producing paralysis of the motor nerves. The tannate, probably owing to its slow solubility, is less liable to disturb the system, but is equally effective as a tæniacide.

Therapy.—When pomegranate decoction can be retained by the stomach it is a certain specific for the destruction and expulsion of tapeworm. When this preparation cannot be used, the tannate, which is far

more easily administered, may be substituted. A semi-proprietory preparation called "granatin" is a salt of pelleterine in solution, and is a very effective destroyer. It is sold ready for administration as a single dose. Locke's method of treating tapeworm is popular with Eclectic physicians. The decoction he advised is prepared as follows: Press 8 ounces of the coarse bark into a vessel and pour upon it three pints of boiling water; boil, strain, and then boil again until but one pint remains. A brisk cathartic should be given at night and a light breakfast allowed in the morning. In the middle of the forenoon four ounces of the decoction should be administered. In order that this may pass quickly into the intestines and its absorption be prevented, as far as possible, a fluidrachm of fluidextract of jalap aromatized with oil of anise or oil of cinnamon should be given with the dose. In two or three hours the dose should be repeated. When the bowels begin to move administer a copious enema, and remove the worm in a vessel filled with warm water so that it may float freely and not be broken. If nausea and vomiting occur upon first giving the decoction, lemon juice should be given and the recumbent position maintained.

When pelletierine preparations are administered a light milk diet in the evening is followed in the morning by a saline purge, and then the combined alkaloids administered. In about one hour another dose of the purgative should be given. Epsom salt, fluidextract of jalap, or castor oil may be used as the cathartic. If the tannate is employed it may be administered in capsule.

GRINDELIA.

The dried leaves and flowering tops of one or several species of Grindelia—as *Grindelia camporum*, Greene; *Grindelia cuneifolia*, Nuttall; or *Grindelia squarrosa* (Pursh), Dunal. (1 and 2) Marshes of California; (3) Western plains. *Dose*, 5 to 40 grains.

Common Name: Grindelia.

Principal Constituents.—A saponin-like resin (*grindelin*), volatile oil, and an alkaloid *grindeline*.

Preparation.—*Specific Medicine Grindelia. Dose*, 5 to 40 drops.

Specific Indications.—Asthmatic breathing with sense of soreness and rawness; harsh, dry cough; dyspnœa with cyanosed countenance. Locally, rhus poisoning; old indolent ulcers. *Grindelia squarrosa:* malarial cachexia with splenic congestion.

Action.—The grindelias have a bitter, acrid taste, leaving an unpleasant, persistent, acrid sensation in the mouth and cause an increased flow of saliva. The kidneys are excited by them and diuresis is increased, while upon the bronchial membranes they produce a primary increase of secretion followed by a lessened expectoration and diminution of the rate of breathing. They are eliminated by the bronchi and the kidneys. Marked relaxation of the bronchi is produced by grindelia.

Therapy.—*External.* Grindelia promotes reparation in damaged conditions of the epithelium. It is especially valuable in chronic skin diseases with feeble circulation and tendency to ulceration. For indolent ulcers a lotion of the specific medicine (fℨii to Water, Oj) may be applied freely upon compresses. It stimulates growth and heals the ulcers. Grindelia similarly applied is one of the best of applications in rhus dermatitis.

Applied to chronic eczema of the vesicular type it has been credited with many cures. Webster asserts it is of value in malignant ulceration, as epitheliomata of the mucosa and the skin. This is claiming much and awaits confirmation from the experience of others.

The leaves of grindelia, smoked alone or mixed with stramonium, lobelia, or potassium nitrate, have been used successfully to relieve the paroxyms of spasmodic asthma.

Internal. Grindelia is a remedy for asthmatic breathing, with pectoral soreness and a sense of rawness. The accompanying cough is dry and harsh and the breathing labored, causing in plethoric individuals a dusky coloration of the face. In some cases it promptly stops the paroxysms of asthma, and in others apparently has no effect. It is useful in subacute and chronic bronchitis, especially in old persons, and in bronchorrhœa and emphysema.

Grindelia squarrosa is credited with antimalarial properties and to relieve splenic congestion and hypertrophy of malarial origin. The indications are dull pain with fullness over the spleen, sallow skin, debility and indigestion, with gastric distress.

The bitter taste of grindelia is best disguised by chloroform.

GUAIACOL.

Methyl Pyrocatechin. (Formula: $C_7H_8O_2$).

Description.—A colorless or yellowish crystalline solid, or a strongly refractive liquid, having an aromatic taste and odor, sparingly soluble in water, but freely dissolved by glycerin. It is prepared from wood-tar creosote, and synthetically from catechol or from ortho-anisidin. *Dose*, 5 to 15 drops.

Preparation.—*Guaiacolis Carbonas*, Guaiacol Carbonate. A white crystalline powder almost insoluble in water, but soluble in alcohol (60), chloroform (1), and ether. *Dose*, 5 to 20 grains.

Action and Therapy.—Applied to the skin during pyrexia, guaiacol is capable of profoundly lowering the temperature. A depression of over seven degrees has been noted. It is exceedingly dangerous when employed in this manner, causing chills, excessive sweating and collapse. Guaiacol was introduced into medicine to take the place of creosote because it acts more kindly upon the stomach and is less apt to irritate the bowels and the kidneys. Under the mistaken notion that it will destroy or cripple the tubercle bacillus, or combine with its toxins, it has been quite extensively, and often indiscriminately, employed in pulmonary tuberculosis. The objects sought—to lessen cough, restrain excessive sweating and diarrhœa, and restrict expectoration—have been realized in some cases. The good that it has done is probably due to its favoring improved digestion and consequently bettering nutrition. Its germicidal power over the tubercle bacillus still lacks substantiation. Inhaled from hot water and taken internally it has benefited cases of acute and chronic bronchitis, with fetid expectoration. Painted upon the tonsils early in acute follicular tonsillitis it is said to abort the infection. As creosote water sprayed upon the throat daily in susceptible individuals wards off throat inflammations, the suggestion to use guaiacol seems reasonable.

Guaiacol is an intestinal antiseptic and in very small doses, one or two grains, it may be used in typhoid and other toxæmic fevers. It is also

antipyretic, but under no circumstances should it be used as such, especially by the method of painting it upon the surface. It is as depressing as the coal-tar antipyretics. The long continued use of guaiacol is open to the same objections as those applying to creosote, which see.

Guaiacol is largely used in the intravenous treatment of phthisis, in association with salicylic acid and other agents. While many favorable reports of improvement have been made, the status of these drugs or of this form of treatment is not as yet established and seems to grow less in favor as time passes.

Guaiacol carbonate is thought to be better borne by the stomach and is given for the same purposes as guaiacol. It is of some value in fermentative dyspepsia, and fetid bronchitis. Guaiacol salicylate is used for similar purposes. Where the patient can tolerate these drugs they may be given for months at a time.

GUAIACUM.

The resin of the wood of *Guaiacum officinale*, Linné, or of *Guaiacum sanctum*, Linné (Nat. Ord. Zygophyllaceæ). West Indian trees. *Dose*, 5 to 30 grains.

Common Names: Resin of Guaiac, Guaiac.

Description.—Greenish, gray-brown fragments, masses or tears of a balsamic odor and slightly acrid taste. Usually admixed with fragments of vegetable tissues. Easily soluble in alcohol, ether and chloroform. *Dose*, 5 to 15 grains.

Principal Constituents.—Three resins: *guaiaconic acid* (70 per cent), *guaiacic acid*, and *guaiaretic acid*.

Preparations.—1. *Specific Medicine Guaiacum*. *Dose*, 5 to 30 drops.
2. *Tinctura Guaiaci Ammoniata*, Ammoniated Tincture of Guaiac (Guaiac, 20 per cent, in Aromatic Spirit of Ammonia). *Dose*, 10 to 30 drops.

Specific Indications.—Dryness and stiffness of the throat with tumid, swollen tonsils, painful deglutition and dribbling of saliva; incipient tonsillitis (early); rheumatic pharyngitis.

Action and Therapy.—*External.* The ammoniated tincture or the dilution of the specific medicine (1 to 3 of alcohol), added to water, acts efficiently as a gargle or preferably a wash, for the forms of sore throat mentioned below.

Internal. Guaiaic once had considerable vogue as a remedy for syphilis, but is practically out of use in that disease at the present day. It was also much used in rheumatism, in which it has a better claim to efficiency. Guaiac is laxative, expectorant, and diaphoretic. When it fails to act upon the skin it usually stimulates the kidneys. Large doses may occasion gastro-intestinal inflammation. It has somewhat of an antiseptic action, which is extended to the secretions caused by it.

The chief uses for guaiac are in rheumatic pharyngitis or rheumatic sore throat and incipient tonsillitis, with angry, red, raw-looking surfaces, where the parts appear to be severely inflamed or greatly congested. The latter may be the type which is the forerunner of an attack of acute inflammatory rheumatism—the tonsils being the foci of infection. In such cases it acts better than in other forms of amygdalitis. While seemingly indicated in active conditions in sore throat and in chronic rheumatism, it is best adapted to passive conditions—cold hands and feet, feeble circulation, and vital depression. In general plethora or inflammation of the gastro-enteric tract it is usually contraindicated. Guaiac has been much em-

ployed in chronic sore throat of syphilitic origin. The best form of administration is a fourfold dilution of specific medicine, mixed with syrup and water. Stronger preparations than this diluted tincture precipitate heavily.

GUARANA.

A dried paste, chiefly consisting of the crushed or pounded seeds of *Paullinia Cupana*, Kunth (Nat. Ord. Sapindaceæ), yielding not less than 4 per cent of caffeine. A shrubby vine of northern and western Brazil.

Common Name: Guarana.

Description.—Cylindrical, dark reddish-brown sticks, paler internally, and admixed with fragments of seeds and integuments. Slight odor, and feeble astringent, bitter taste. Partly soluble in water and in alcohol. *Dose*, 15 to 30 grains.

Principal Constituents.—*Caffeine*, volatile oil, saponin, and tannin.

Preparation.—*Specific Medicine Guarana. Dose*, 10 to 30 drops.

Specific Indications.—Headache with pallor, weak circulation, the pain aggravated by exertion; sick headache (migraine), with cerebral anemia; menstrual headache, with cerebral anemia; mental exhaustion or depression; headache from dissipation.

Action and Therapy.—Guarana is a gentle excitant acting very much like tea and coffee. It is valuable where the brain becomes exhausted or depressed through mental overwork, or when the body is fatigued or exhausted. It must be carefully used as it sometimes causes difficult urination. Neither should it be employed in neuralgias that are aggravated by stimulation of the heart. It is indicated only in atonic conditions.

Guarana is a remedy for the relief of nervous headache, or those forms following menstruation or drunkenness. The face is pale, the pulse feeble, the eyes dull and expressionless, and nausea is prominent. Every movement causes an aggravation of the pain, the patient is mind-weary, and cerebral anemia is always present. It sometimes relieves lumbago, and while contraindicated in sthenic neuralgias it sometimes relieves occipital neuralgia when the indications are as given above. Temporary paralysis of the motor oculi nerve, followed by headache, has been relieved by it. In headaches the doses of 20 to 30 drops of the specific medicine should be given.

GYNOCARDIA.

The seeds and oil of *Gynocardia odorata*, Robert Brown (Nat. Ord. Bixinaceæ). An East Indian tree. See Preface; also *The National Geographic Magazine*, March, 1922; p. 243.

Common Names: Chaulmoogra, Chaulmugra.

Principal Constituent.—A granular oil (Oil of Chaulmugra) containing *gynocardic acid*. It has an acrid taste. *Dose*, 2 to 3 drops.

Action and Therapy.—Oil of chaulmugra has given surprisingly good results in leprosy; and it has often failed. The dexterity with which it has been adulterated has probably stamped the medicine with an uncertain reputation. It is used both locally and internally. Many other uses, chiefly local, are ascribed to it, but the agent is seldom employed in this country, though it is of interest to physicians going to countries where leprosy abounds.

HÆMATOXYLON.

The heart-wood of *Hæmatoxylon campechianum*, Linné (Nat. Ord. Leguminoseæ). Jamaica and the West Indies.

Common Name: Logwood.

Principal Constituents.—Tannin and *hæmatoxylin*, an alkaloidal indicator.

Preparations.—1. *Decoctum Hæmatoxyli*, Decoction of Logwood (Logwood, ℥j; Water, Oj). *Dose*, 1 to 2 fluidounces.

2. *Extractum Hæmatoxyli*, Extract of Hæmatoxylon. *Dose*, 5 to 30 grains.

3. *Specific Medicine Logwood. Dose*, 5 to 30 drops.

Action and Therapy.—A mild, unirritating astringent and tonic formerly much used in chronic diarrhœa and summer complaint of children, and in passive hemorrhages, and colliquative sweats. It is now seldom employed.

HAMAMELIS.

The leaves, bark and twigs of *Hamamelis virginiana*, Linné (Nat. Ord. Hamamelidaceæ), collected in the autumn. Common in the United States. *Dose*, 5 to 60 grains.

Common Names.—Witch-Hazel, Snapping Hazelnut, Winterbloom.

Principal Constituents.—A bitter body, tannin, and a volatile oil.

Preparations.—1. *Aqua Hamamelidis*, Hamamelis Water, (Distillate of Hamamelis, Distilled Witch-Hazel, Distilled Extract of Witch-Hazel). *Dose*, 5 drops to 2 fluidrachms.

2. *Specific Medicine Hamamelis. Dose*, 5 to 60 drops.

Specific Indications.—Venous debility, with relaxed and full tissues; pallid mucosa or occasionally deep red from venous engorgement, or deep blue from venous stasis; excessive mucous flow, with venous relaxation; passive hemorrhages; prehemorrhagic states, with venous fullness; varicoses; hemorrhoids with weight and fullness; rectal prolapse; dull aching pain in pelvis, genitalia, or rectum, with perineal relaxation and fullness; relaxed or engorged and painful sore throat; gastro-intestinal irritability, with venous weakness and mucous or muco-bloody passages. Locally to inflamed, ulcerated or wounded skin or mucosa, especially where venous circulation is debilitated; contusions, bruises, and muscular soreness from exertion or exposure.

Action and Therapy.—*External.* Witch-hazel bark and its fluid preparations are astringent. The distillate and the specific medicine are sedative and slightly astringent. The latter two form agreeably grateful and soothing applications to the skin and mucous surface in irritated and inflamed conditions and where venous relaxation is present. The specific medicine is an elegant and heavy distillate, carrying a large proportion of the oil, as compared to the ordinary distillate, and is much to be preferred where a bland and soothing yet astringent effect is required. Where more alcoholic stimulation is permitted or desired the ordinary distillate may be used. As a rule, the specific medicine is best for use upon mucous, and the distillate upon the cutaneous surfaces.

Witch-hazel distillates are splendid applications for sprains, contusions, wounds and inflamed swellings, and for sunburn, tan, freckles, and dilatation of the capillaries of the skin. They are cooling and relieve smarting and pain. Used alone or combined with an equal quantity of bay rum they form an elegant face wash to remove excess of soap and heal abrasions after shaving. Witch-hazel is one of the most comforting applications for painful hemorrhoids. It may be used ice cold or hot, as

preferred. Applied to the tender parts after the parturient toilet, it removes soreness of the tissues from childbirth. Rubbed upon the skin, or applied by means of compresses, it is an efficient lotion for muscular soreness and aching after severe exertion; from cold, exposure, or when due to bruises and strains. Its use should be accompanied with gentle massage. Compresses wetted with witch-hazel give marked relief in acute cutaneous inflammations, chafing, and especially in mammitis.

Incised wounds, ragged cuts from glass or tin, barbed wire injuries, and crushed fingers are quickly relieved of pain and heal rapidly when the following is applied: ℞ Echafolta, fl℥ss; Asepsin, gr. xv; Specific Medicine Hamamelis, Water, aa, q. s., fl℥iv. Mix. Apply upon gauze. A similar preparation, with but two drachms of the echafolta, or the distillate with menthol, makes a good dressing for burns and scalds. Glycerin and hamamelis, equal parts, or equal parts of Specific Medicine Hamamelis and Lloyd's Colorless Hydrastis give excellent results in irritation and inflammation of the aural canal due to inspissated cerumen, or to efforts to remove the latter.

Sprayed upon the throat the specific medicine or the distillate, suitably diluted, is a useful and sedative astringent for angry and deep red sore-throats, with relaxation of membranes; or in pharyngitis, faucitis, and tonsillitis, with hyperæmia or congestion. The specific medicine is especially soothing and astringent in congestive nasal catarrh. Few local washes give greater relief in the angina of scarlet fever than those of which witch-hazel forms a part. They relieve pain, cleanse the parts, and constringe the relaxed tissues and dilated vessels. It may also be added to local washes for use in diphtheria.

Together with colorless hydrastis, or other non-alcoholic hydrastis preparations, with or without a grain of alum or of zinc sulphate, it is a most effective collyrium for acute conjunctivitis, with dilated conjunctival vessels. Especially is it effective in vernal conjunctivitis. The same combinations are exceedingly useful as an injection in gonorrhœa, after the acute symptoms have subsided and a catarrhal state has supervened.

Internal. Hamamelis has an important tonic effect upon venous debility, acting upon the coats of the veins throughout the body. Unlike some vascular remedies its action is not merely local, but extends throughout the whole venous system. It is therefore a remedy of much value in varicoses, hemorrhoids, and passive hemorrhages. When indicated, the tissues are pallid and relaxed, and in some instances deep red, due to venous engorgement. There is a sense of fullness or thickening and weight and congestion. These are especially prominent in the type of hemorrhoids benefited by hamamelis. It is of some value in oozing of blood from the mucosa, in passive bleeding from the nose, lungs, and stomach, but is a better remedy for the venous relaxation that precedes these hemorrhages and which renders their occurrence easy. It is of less value in hemoptysis than lycopus, and is adapted to such cases as are benefited by geranium and erigeron.

Hamamelis is a decidedly useful remedy in congestive conditions with marked tissue debility. It should be given a fair trial in congestion of the ovaries, with dull aching pain and sense of weight and fullness; in chronic congestive conditions of the uterus, with soft and flabby cervix and patulous

os; in uterine subinvolution; and in leucorrhœa, with sponginess of the vagina and tendency to prolapsus of the womb; and in prolapse of the rectum, with venous fullness. It frequently relieves in varicocele, with sense of weight and dragging.

Hamamelis should also be given in nasal catarrh and ozæna, with congestion and tendency to recurring epistaxis, and thickened and relaxed mucosa, with abundant mucous or muco-purulent discharge; and in chronic inflammation of the fauces, pharynx, and larynx with sluggish venous circulation, and greatly relaxed tissues. For chronic diarrhœal, and sometimes acute bowel disorders, as cholera infantum and dysentery, it is promptly curative when much mucus is passed, and especially if the passages are tinged with blood. In all cases in which it is indicated there is debility of the venous circulation and relaxation of the mucosa; and where possible it should be used concurrently internally and locally.

HEDEOMA.

The leaves and tops of *Hedeoma pulegioides* (Linné), Persoon (Nat. Ord. Labiatæ). Common in American woods and waste places. *Dose*, 5 to 60 grains.

Common Names: Pennyroyal, American Pennyroyal, Squawmint, Tickweed.

Principal Constituent.—A fragrant volatile oil (*Oleum Hedeomæ*).

Preparations.—1. *Specific Medicine Pennyroyal. Dose*, 5 to 60 drops.
2. *Oleum Hedeomæ*, Oil of Pennyroyal. *Dose*, 2 to 10 drops.
3. *Infusum Hedeomæ*, Infusion of Pennyroyal (℥j to Water, Oj), *ad libitum*.

Specific Indications.—Amenorrhœa of long standing, with pallor and anemia and dark circles around the eyes; the patient complains of languor, lassitude, takes cold easily, has pain in back and limbs, and exhibits full, prominent veins (Hennell); suppressed lochia.

Action.—Oil of pennyroyal produces toxic effects when given in overdoses. A drachm caused severe headache, difficult swallowing, intense nausea, severe retching without emesis, intolerable bearing down, labor-like pains, abdominal tenderness, constipation, dyspnœa, semiparalysis of the limbs, and nervous weakness and prostration.

Therapy.—*External.* Oil of Pennyroyal is rubefacient and relieves the itching of insect bites. It is useful in embrocations for rheumatic pain. It is sometimes applied to the hands and face to protect against mosquitoes, fleas, and other insects. A cloth saturated with oil of pennyroyal may be hung in sleeping apartments to repel such insects.

Internal. Oil of Pennyroyal is useful in nausea, stomach cramps, flatulent colic, and amenorrhœa in debilitated subjects. It is frequently used to prevent griping from other medicines. It may be given upon sugar or in emulsion. It and the dilution in alcohol are also credited with calmative properties in spasmodic cough, whooping cough, and in hysteria from menstrual debility. A drachm of the specific medicine given in hot water is the most certain agent we possess to restore suppressed lochia. The infusion is a popular and pleasant remedy for acute colds. It acts chiefly as a diaphoretic, and for this effect it is one of the most certain of medicines; and a relic of domestic methods once in favor among physicians, as well as the laity.

HELLEBORUS.

The root of *Helleborus niger*, Linné (Nat. Ord. Ranunculaceæ). Subalpine woods of central and southern Europe. *Dose*, 1 to 10 grains.

Common Names: Black Hellebore, Christmas Rose.

Principal Constituents.—Two toxic glucosides, *helleborin* (acting upon the heart and as a drastic cathartic), and *helleborein* (narcotic).

Preparation.—*Specific Medicine Helleborus. Dose*, 1/10 to 3 drops.

Action and Therapy.—Hellebore is a powerful gastro-intestinal and nerve poison, and produces death by convulsions and exhaustion. Small doses stimulate the heart. Large doses are drastically cathartic, and in this way it exerts also emmenagogue effects. Helleborus was once largely used as a revulsive in various types of insanity, but is no longer employed for such a purpose. In minute doses it may be employed to increase cardiac power and arterial tension and slow rapid action of the heart. It increases renal activity and has caused rapid disappearance of non-compensatory symptoms in heart disorders. It is also suggested when there are jelly-like passages in bowel affections. Scudder advised it as an emmenagogue when the patient is annoyed by flashes of heat, burning of the surface of the thighs and nates, and sensitiveness of the pelvic and perineal tissues. Properly used it might prove of advantage in hypochondria dependent upon reproductive atony. The dose should be fractional. ℞ Specific Medicine Helleborus, gtt. v; Water, fl℥iv. Mix. Sig.: One teaspoonful every two to four hours.

HELONIAS.

The rhizome of *Chamælirium luteum*, Gray (*Helonias dioica*, Pursh)—(Nat. Ord. Melanthaceæ). Abundant in woodlands, meadows, and wet places in some parts of the United States. *Dose*, 10 to 30 grains.

Common Names: Blazing Star, Unicorn Root, Starwort, Drooping Starwort, Devil's Bit.

Principal Constituent.—A yellowish, bitter principle, *chamælirin*.

Preparation.—*Specific Medicine Helonias. Dose*, 10 to 30 drops.

Specific Indications.—Sense of weight, congestion, or expulsion of the pelvic contents, with mental torpor, despondency, or irritability; gastric and other disturbances reflexly due to pelvic relaxation; strong, sticky leucorrhœa; pelvic fullness with discharge.

Action and Therapy.—Tonic, diuretic, and vermifuge. (For relation to Aletris, compare *Aletris*.) Helonias is a valuable uterine tonic, specifically adapted to uterine weakness in which relaxation of tissue is so great as to give the sensation of downward pressure, dragging or expulsion—or as the patient expresses it, "a sensation as if everything in the pelvis would fall out or be expelled." Marked irritability and despondency are often associated with such disorders, and when menstruation occurs there is a feeling of undue fullness, as if the womb and rectum were distended with blood, and about to be pushed out of the body. There is associated aching and propulsive pain. In anemic cases the drug is useful in amenorrhœa, and in leucorrhœa should be given internally, while hot antiseptic and astringent injections are used locally. Helonias is said to correct sexual lassitude in both sexes, and to have checked nocturnal losses due to excesses and associated with enfeebled body, impaired memory, and mental apathy.

In chlorotic anemia dependent in a measure upon uterine and ovarian weakness, it is also asserted to be very serviceable, and reputed to improve loss of appetite, indigestion, and malassimilation when aggravated by sexual weakness. It is also said to relieve the nausea and vomiting of pregnancy, to prevent miscarriages, and to correct gastric complications of albuminuria.

HEPATICA.

The leaves of *Anemone acutiloba*, Lawson, and of *Anemone Hepatica*, Linné (Nat. Ord. Ranunculaceæ). Common in rich woods in the United States. *Dose*, 5 to 60 grains.

Common Names: Liverleaf, Liverwort, American Liverleaf, Kidney Liverleaf (A. Hepatica), Heart Liverleaf (A. acutiloba).

Principal Constituents.—Tannin, mucilage, and a bland oleoresin.

Preparation.—*Specific Medicine Hepatica. Dose*, 1 to 60 drops.

Specific Indication.—Irritation and hypersecretion of mucous membranes.

Action and Therapy.—A mild, mucilaginous astringent, used sometimes to allay bronchial irritation, with free secretion and similar conditions of the gastro-intestinal tract. It may be exhibited when there is subacute or acute inflammation, and in cough with expectoration of bloody mucus. It is one of the negative medicines that occasionally meets special conditions when more energetic agents, seemingly indicated, would aggravate. It came into use under mistaken identity for another plant and acquired a great reputation for virtues it did not possess. The infusion may be given liberally.

HEXAMETHYLENAMINA.

Hexamethylenamine, Urotropin, Formin, Aminoform.
(Formula: $(CH_2)_6N_4$.)

Description.—Colorless, lustrous crystals, or a white powder, without odor, and of a sweetish taste. It is of an alkaline reaction, and when heated evolves a fishy odor. Very soluble in water, cold or hot; or alcohol, and less so in ether. *Dose*, 1 to 8 grains (usual dose, 4 grains).

Action and Therapy.—Urotropin is a urinary antiseptic. In the body it has no effect as hexamethylenamine, but when dissociated into its original components—ammonia and formaldehyde—the latter acts as an inhibiting agent upon microbial organisms and thus exerts its antiseptic power. To obtain the best effects from urotropin the urine must be acid, particularly if colon bacilli are present, and while said not to act so well in the presence of alkaline urine, because of the readiness with which the formaldehyde unites with ammonia, it seems nevertheless to clear up cloudy urine when alkaline and pus-laden, and phosphates and amorphous urates are present. When desired to produce the proper medium for its best action the urine may be rendered acid by first giving acid sodium phosphate. The formaldehyde seems to be liberated mostly in the bladder, and has consequently been most effective in purulent cystitis, ammoniacal urine, and pyelitis, and in the passing of the urine its influence is extended to gonorrhœal infection. It is used also in posterior urethritis and prostatitis when occasioned by the latter or other pus infections. For sterilization of the urine in typhoid fever it is believed to prevent cystitis, which sometimes occurs, through the resorption of typhoid bacilli, and to be a good precautionary measure to prevent the infection of others through this secretion

finding its way into sources of public water supply. Urotropin is asserted to be a most effectual drug in phosphaturia; and, while used, it seems less valuable in some forms of gravel, calculi and gouty concretions, notwithstanding the fact that formaldehyde forms soluble compounds with uric acid.

Outside of its urinary effects, and in the hope that formaldehyde disinfection may be possible in other fluids, it has been advised in such disorders as are associated anatomically with the secretion of cerebro-spinal fluid, nasal mucus, the bile, and pancreatic juice. Here the attempt at prophylaxis as well as treatment has been made. Therefore it has been advised, and sometimes seemingly successfully used, in acute coryza, acute anterior poliomyelitis, cerebro-spinal meningitis, influenza, and gall bladder infections. If the therapeutic results are to be expected solely from the liberation of the formaldehyde, which is a powerful disinfectant, it is obvious that it can only act when the medium is such as to cause the freeing of that body. As such is only positively known to occur to any great degree, at least, in the urine, it would appear that only such disorders as can be attacked through that excretion would be benefited. This also accords with the generality of clinical experience, although some are enthusiastic over its reputed activity in meningeal infections. When general infections are caused by colon bacilli it is said to be a certain remedy.

Urotropin in large doses, or long continued, causes, through the formaldehyde irritation, discomfort and pain along the urinary tract, accompanied by excessively acid urine, headache, ringing in the ears, abdominal distress and diarrhœa, and a rubeloid eruption. These are the signals to discontinue the drug or to use it less frequently, or in smaller doses. The ordinary dose for an adult is 10 to 30 grains three times a day in a glass of water or carbonated water. Lesser doses should be given to children.

HIPPOCASTANUM.

The bark and fruit of *Æsculus Hippocastanum*, Linné (Nat. Ord. Sapindaceæ). Asia and Europe; planted in United States. *Dose* (bark), 1 to 60 grains; (rind of nut) 1 to 10 grains.

Common Name: Horse Chestnut.

Principal Constituents.—*Æsculin*, the glucoside giving fluorescence to watery and alkaline solutions, *argyræscin*, and a sternutatory, *saponin* (*aphrodæscin*).

Preparation.—*Specific Medicine Horse Chestnut. Dose*, 1/10 to 10 drops.

Specific Indications.—Vascular engorgement, with dull, aching pain and fullness, throbbing of the vessels, and general malaise; visceral neuralgia; disturbances reflex from vascular congestion of the rectum.

Action and Therapy.—The action and therapeutic uses of hippocastanum are closely similar to those of *Æsculus*, which see. By some it is believed to have a somewhat stronger action upon the venous circulation. It is often a remedy of value in neuralgia of the abdominal and pelvic viscera, when there is plethora. It is a remedy for congestion and engorgement, and not for active conditions. Uneasy and throbbing sensations, with dull, aching pain in any part of the body, but especially in the hepatic region, is an indication for it. It may be used for non-bleeding piles when full, purple and painful, with a feeling as if a foreign body is in

the rectum; there may also be itching and heat, or simply a sense of uneasiness or discomfort. When proctitis and neuralgic pain come from this engorged hemorrhoidal state it is effective, as it is also in reflex disorders depending upon the rectal involvement—such as headache, spasmodic asthma, dyspnœa, dizziness, and disturbed digestion.

HOMATROPINÆ HYDROBROMIDUM.

Homatropine Hydrobromide, Homatropine Bromide, Homatropine Hydrobromate. (Formula: $C_{16}H_{21}NO_3$. HBr.)

Description.—A white crystalline powder, or small prismatic crystals, odorless, and soluble in water and alcohol. Great caution should be used in tasting it, and then only in very dilute solutions. *Dose*, 1/120 grain.

Action and Therapy.—This salt acts much like atropine, causing a quite full dilatation of the pupil, but having less of a paralyzing influence upon accommodation. As compared with atropine the mydriasis is transient, lasting usually not more than a day, while that from the former persists for several days. It is therefore preferred for diagnostic purposes and in refraction work, while atropine is more valuable where prolonged mydriasis is desired, as in iritis. It is especially valued in eye work in middle-aged individuals. Like atropine it is contraindicated in glaucoma or in tendency to increased ocular tension. A one-per-cent solution is usually preferred for ophthalmic purposes.

HORDEUM.

The decorticated seeds of *Hordeum distichon*, Linné (Nat. Ord. Graminacæ). Native of central Asia; cultivated in all tropical and temperate climes.

Common Name: Barley.

Principal Constituents.—Maltose, dextrin, fatty matter, starch and proteids. It contains no gliadin, as does wheat, hence no gluten can be obtained from it. After germination it yields *diastase* (maltine), a starch-digesting body.

Preparation.—*Decoctum Hordei*, Decoction of Barley (Barley Water). *Dose, ad libitum.*

Action and Therapy.—Outside of its food value in broths, barley is useful as a demulcent and drink for fever patients and those suffering from diarrhœal complaints. Barley flour, made into a thin pap, is useful in infant feeding, and a decoction of barley provides a soothing injection for rectal inflammations and a medium for the conveyance of medicines into the bowels in dysentery. It is also a good gastric lenitive after acute poisoning by irritants.

HUMULUS.

The strobiles of *Humulus Lupulus*, Linné (Nat. Ord. Urticaceæ). Europe and Asia; common in cultivation.

Common Names: Hops, Hop.

Principal Constituents.—*Lupulin* (see Lupulinum), hop-bitter acid, humuli-tannic acid, resins, volatile oil and asparagine, trimethylamine, and choline.

Preparation.—*Specific Medicine Humulus. Dose*, 1 to 60 drops.

Specific Indications.—(See *Lupulinum.*)

Action and Therapy.—*External.* A "hop-pillow" is a favorite device for procuring sleep. The odor of the hop has a decidedly sedative influence upon some individuals, relieving headache and producing sleep; in others it produces intense headache, with nausea and vomiting. Probably the

psychic effect has much to do with its value in insomnia. A hot "hop bag" applied to the face is a favorite domestic cure for neuralgic face ache, and a "hop poultice" has anodyne properties.

Internal. This is a remedy to relieve nervous excitability in fevers and to induce sleep. It also checks fermentation of the stomach contents and thus proves useful in fermentative dyspepsia with acid eructations. For other uses see *Lupulinum*, which has superseded hops largely as an internal medicine.

HYDRANGEA.

The root of *Hydrangea arborescens*, Linné (Nat. Ord. Saxifragaceæ). A handsome shrub along streams and in damp, rocky situations in the southern and middle-west states of this country. *Dose*, 5 to 60 grains.

Common Names: Wild Hydrangea, Seven Barks.

Principal Constituents.—The glucoside *hydrangin* ($C_{34}H_{26}O_{11}$), saponin, resins, and fixed and volatile oils.

Preparation.—*Specific Medicine Hydrangea. Dose*, 5 to 60 drops.

Specific Indications.—Vesical and urethral irritation, with gravel; difficult urination; deep-seated renal pain; bloody urine; irritation of the bronchial membranes.

Action and Therapy.—Hydrangea is diuretic and sedative to cystic and urethral irritation, with passage of gravelly urine. It does not dissolve gravel, but is believed to be of value in preventing their formation, especially alkaline and phosphatic concretions. It should be administered in hot water. Hydrangea may be used in any renal disorder with dysuria, blood in the urine, or deep-seated pain in the region of the kidneys. It is not contraindicated by inflammation and may be employed with safety in acute nephritis. It is especially serviceable in alkaline urine and in bladder irritation of the aged with tendency to catarrh. Unquestionably hydrangea has a kindly action upon the mucosa of the urinary organs and it has alterative properties making it useful in strumous diseases.

HYDRARGYRUM.

Mercury, Quicksilver (Symbol, Hg.).

Description.—A silver-white liquid element, odorless and tasteless, very heavy, and when divided cohering in globules.

Preparations.—1. *Hydrargyri Chloridum Corrosivum*, Corrosive Mercuric Chloride (Corrosive Sublimate, Bichloride of Mercury, Mercuric Chloride). $HgCl_2$. Heavy crystals or masses, or a white powder, permanent, odorless, and of a strongly metallic taste. (Should not be tasted, as it is intensely poisonous.) Soluble in alcohol, glycerin, and less so in water and ether. *Dose*, 1/100 to 1/20 grain.

2. *Hydrargyri Chloridum Mite*, Mild Mercurous Chloride (Calomel, Mercurous Chloride). Hg_2Cl_2. A permanent odorless and tasteless, impalpable powder. Insoluble in water, alcohol, or ether. *Dose*, 1 to 5 grains (laxative); 1/4 grain (alterative); of 3 x trituration, 2 to 3 grains.

3. *Hydrargyrum Ammoniatum*, Ammoniated Mercury (White Precipitate). Odorless and permanent, white, easily powdered pieces, or a white powder; taste earthy, followed by styptic metallic sensation. It is not dissolved by water or alcohol. Used locally chiefly in Unguentum Hydrargyri Ammoniati.

4. *Hydrargyri Protonitras*, Protonitrate of Mercury (Mercurous Nitrate). Easily decomposable. A constituent of *Brown Citrine Ointment*.

5. *Hydrargyri Iodidum Flavum*, Yellow Mercurous Iodide (Yellow Iodide of Mercury, Protoiodide of Mercury, Mercurous Iodide). An odorless and tasteless, non-crystalline, bright-yellow powder. It gradually decomposes in the presence of light. Insoluble in alcohol or ether, and nearly insoluble in water. *Dose*, 1/30 to 1/4 grain.

6. *Hydrargyri Iodidum Rubrum*, Red Mercuric Iodide (Biniodide of Mercury, Red Iodide of Mercury, Mercuric Iodide). A permanent, odorless and almost tasteless, scarlet-red, non-crystalline powder; nearly insoluble in water, sparingly soluble in alcohol or ether, and very much less soluble in chloroform. *Dose*, 1/200 to 1/10 grain (see below).

7. *Hydrargyri Oxidum Flavum*, Yellow Mercuric Oxide (Yellow Oxide of Mercury). A heavy, impalpable, pale orange-yellow, non-crystalline powder; without odor; taste, metallic; permanent in air, but when exposed to light becomes darker in color. Not soluble in alcohol and almost insoluble in water. Used locally chiefly in *Unguentum Hydrargyri Oxidi Flavi*.

8. *Hydrargyri Salicylas*, Mercuric Salicylate (Mercuric Subsalicylate). *Dose*, 1/15 to 1/8 grain.

Specific Indications and Uses.—*I. Corrosive Sublimate.* Tongue small, contracted, elongated, and pointed, and of normal color, or of increased redness, and prominent papillæ; urine must be normal in specific gravity and deposit no sediment; circulation good; lips of good color, and skin elastic (Scudder). Impaired mucous membrane of colon and rectum in chronic dysentery and cholera infantum, with ulceration, pain, tenesmus, and semipurulent discharges (Webster).

II. Calomel. Tired, apathetic, or lethargic condition, with marked drowsiness in daytime, and sleeplessness at night. Locally, to sluggish corneal ulcers and pale chancroids covered with a pultaceous secretion.

Action.—In the metallic state mercury is inert as a medicine except when in a state of minute division; but its oxides and other compounds possess exceedingly active properties. Metallic mercury, undivided, may be taken in considerable amount, acting by its weight merely as a purgative. If, however, it be retained in the intestinal tract so as to form soluble salts, or if in prolonged contact with the skin, it will produce the constitutional effects. Thus the blue ointment and mercurial plaster have caused alarming symptoms. The vapor of metallic mercury is exceedingly poisonous. Murrell records an account of the wrecking, near Cadiz, of a vessel, and the recovery of several tons of quicksilver by the crew of an English man-of-war, whereby 200 of the crew were sickened, with two fatalities, besides the destruction of animals, fowls, and roaches, all in consequence of the rotting of the sacks containing the metal. From the vapors from a fire in the quicksilver mines at Idria, over 900 individuals residing in the vicinity were attacked with trembles.

Almost all the mercurial preparations act in the same way, possessing sialagogue, deobstruent, alterative, etc., properties, the character and degree of which are diminished or augmented by the medicines used in combination with them. These effects, however, are rarely increased physiological effects, but pathological in character. Bartholow, in considering the action of the mercurials upon the glandular system, very properly observes that "these actions of mercury should not be regarded as a physiological stimulation of the intestinal glands, in the sense that the foods are stimulant to these organs. The action is pathological, and the products of the action are pathological" (*Materia Medica*, page 248). The mercurials, when long continued, and, in many instances but few doses, with some very susceptible constitutions, induce a succession of very serious symptoms ushered in by tenderness when the teeth are compressed against each other, spongy and readily bleeding gums, swollen tongue, intolerably fetid breath and profuse ptyalism or salivation. This is the signal that no more of the drug should be used. Continued use is followed by ema-

ciation, general debility, œdema, tremor of the limbs, diseased liver, pain in the bones, caries, palsy, ulcerations of the pharynx and other parts, gangrenous ulceration of the mouth and face, and a sort of scorbutic marasmus. It also occasionally produces a febrile condition, with profound prostration (mercurial erethism), profuse prespiration, several forms of skin disease (as eczema, herpes), inflammation or congestion of the eye, fauces, or peritoneum, nodes, enlargement of the inguinal, axillary, mesenteric, parotid, pancreatic, etc., glands, together with various painful and nervous attacks. The jaws become the seat of necrosis, as a result of infection through primary periosteal ulceration, the teeth drop out, and as a general dissolution of the tissues takes place the victim dies.

Before the vigorous fight of the Eclectics against the mercurials as cholagogues, it was the prevailing opinion that these salts, particularly calomel, increased the natural secretions of the liver, thereby causing an augmented flow of bile. Reliable experimentation by pharmacologists has proved the claims of our practitioners to be largely true. While it is still admitted by some that corrosive sublimate is slightly stimulant to the liver, the majority deny even to this salt cholagogue powers. That calomel has no such action is now universally acknowledged. "There is, in fact," says Cushny, "no sufficient experimental or clinical evidence that the liver is in any way affected directly by mercury. The 'biliousness,' which is so often relieved by calomel or the blue pill, is due, not to the liver, but to disorder of the alimentary tract." If an increased flow of bile into the intestinal canal does sometimes take place under the action of the mercurial, it is caused, as with croton oil, by the reflex contraction of the gall-bladder and duct, due to the duodenal irritation produced. This was the view held by Bartholow, among others. The long-continued use of mercury has caused an altered biliary secretion, and has even checked hepatic activity. Practical studies upon women with biliary fistula, notably those of Pfaff, Balch and Joslyn, confirm the suspected fact that calomel and corrosive sublimate both invariably rather diminish than increase the flow of bile.

Briefly, the distinctive effects, aside from the general mercurial impression, of mercury and its chief salts are as follows: Metallic mercury, undivided, is a mechanical purgative; in a divided state, as in gray powder, blue mass, and blue ointment, it becomes an active agent capable of all the untoward effects of this class of agents. Blue pill readily causes salivation, calomel less frequently. The general action of calomel closely resembles that of mercury in the divided state. Calomel probably passes for the most part into the intestines, where the alkaline secretions convert it into oxide of mercury. Mercuric chloride, mercuric iodide, mercuric cyanide, and mercuric nitrate are exceedingly energetic and toxic agents. Some of the mercurials, particularly the corrosive chloride and the biniodide, are energetic germicides. The anthrax spores are destroyed by the first in a solution of 1 to 1000, in the blood 1 to 8000. It also quickly destroys infusoria (1 to 50000). Mercury in dilution "(1 to 200000) destroys spirochetes in the test-tube" (Cushny).

While largely employed as a germicide, "there is no question that the germicidal power of corrosive sublimate has been much overestimated" (Cushny). This agrees with the views of Eclectic physicians.

In 1846, in the *Western Medical Reformer*, Dr. John King published a paper on the "Modus Operandi of Mercury" in an attempt to give to Eclectics a scientific basis for explaining the action and effects of mercurials. King's paper was published at a time when nearly all the authorities of the old school disclaimed any knowledge of the manner in which mercury operated physiologically or chemically. The chemical theory he advanced, that it is converted into an oxide, though vaguely hinted at by others, became the prevailing theory for many years. Much dissension is shown at the present day over the question as to the form in which mercury enters the circulation, some contending as an oxyalbuminate, or with Miahl of France, that all mercury compounds are transformed into the bichloride in the stomach and bowels, and uniting in the blood with sodium chloride, become converted into a double chloride of sodium and mercury; or with Henoch of Germany, that an albuminate is produced, or as claimed by Voit, also of Germany, a chloroalbuminate. It is generally accepted that it is eliminated as an albuminate. "All these theories," says Hare, "as to its absorption are open to grave criticism." Therefore it would appear that with all the enlightenment possible, from the advantages of chemical and physiologic equipment of to-day, we are little nearer an explanation of the modus operandi of the mercurials than was the scientific physician nearly three quarters of a century ago. King's theory as to its absorption as an oxide lacked but a step to that now accepted by many—that it enters the circulation as an oxyalbuminate. It must be remembered that the chemistry of the albumens is of much more recent elaboration. The value of his paper consists in exhibiting the fact that the early Eclectics were not wholly uncultivated nor ignoramuses, as some would have us believe, but that such leaders as King were thoroughly grounded in the chemical knowledge of the day and that the mass of Eclectic physicians welcomed scientific explanations.

As stated above the internal modus operandi of the mercurials is still not well understood. In the stomach they probably form an albuminate, which, though insoluble in water, is readily dissolved by chloride of sodium and by an excess of albumen. Minute doses are said to increase the red blood discs; large doses destroy the blood discs, reduce fibrin, and poison the heart. Mercurials have a special affinity for the glandular structures. This is well marked in their action upon the salivary glands. The former practice of "touching the gums," or producing profuse salivation (mercurial ptyalism), has been, largely through the stand taken by the Eclectic school, abandoned. This disagreeable condition, which formerly produced untold misery, exhibited itself in its worst form by an enormous increase of thick, ropy albuminous saliva, subsequently becoming thin and watery, and amounting to several pints in a day. Then followed extensive ulceration, or gangrenous stomatitis of the cheeks and adjacent structures, with tender and swollen glands, sloughing of the cheek and gum, allowing the teeth to fall out and the jaw to become carious. Practical medicine has no greater stain upon her escutcheon than the memory of the horrors of acute mercurialism, as formerly practiced. So profound was the condition of mercurial cachexia, hydrargyrism, or mercurial erethism from continued doses of these drugs, that profound marasmus, anemia, and excessive purging

soon led the victim to an untimely grave. This condition was frequently accompanied by the mercurial tremor, neuralgia, paralysis, or epileptiform convulsions. Scrofulous individuals and those laboring under renal affections are said to be more susceptible to the untoward action of the mercurials, while children are less readily salivated.

Artisans who are employed as gilders, and who work in looking-glass, thermometer, and barometer factories, and miners of quicksilver, are afflicted with a somewhat different form of mercurialism, marked features of which are prostration and anemia, mercurial fever, pustular or vesicular eruptions, jerky, stammering speech, convulsions, and particularly a peculiar form of muscular weakness denominated "the trembles." These tremors (or "shaking palsy") manifest themselves first in the upper limbs, then in the legs, and finally in the trunk. They are readily brought on, gradually increase in extent and severity, and are quite persistent and uncontrollable. The prehensile movements lack precision, and the lower extremities, in walking, tremble as if strung on wires. (For a graphic account of this condition, see Murrell's *Manual of Materia Medica and Therapeutics*, 1896, p. 204.)

Toxicology.—Only the soluble salts of mercury cause acute poisoning. The prolonged use of these even in non-poisoning doses gradually induce chronic poisoning, as do the internal and local use of the less soluble preparations. This chronic form is known as "mercurialism".

Taken internally, corrosive sublimate is an active, corrosive poison, acting very quickly, and producing in overdoses a coppery, metallic taste, and violent burning pain in the mouth, throat, œsophagus, and stomach; great difficulty of swallowing, sense of suffocation, nausea, violent vomiting, increased by everything taken into the stomach; the pain soon becomes diffused over the whole abdomen, which becomes very sensitive to pressure; violent purging, often of blood; great anxiety; flushed (occasionally pale) and even swollen countenance; restlessness; pulse quick, small and contracted; cold sweats; burning thirst; short and laborious breathing; urine frequently suppressed; and finally stupor, coma, convulsive movements, partial paralysis, or paraplegia, and death. Fainting often precedes death. Sometimes before death ensues, if time enough has elapsed, there may be profuse salivation, ulceration of the mouth, fetor of the breath, and other secondary mercurial symptoms. The mouth and œsophagus appear whitish, as if having been painted with silver nitrate solution (Taylor). On inspection after death, the membranes of the mouth, throat, and œsophagus are softened and whitish or bluish-gray, and show marked inflammation, while the stomach and bowels will be found excessively inflamed, sometimes with patches of ulceration or gangrene. (Arsenic lesions are confined chiefly to the stomach and bowels.) Corrosive sublimate poisoning differs from arsenical poisoning in the metallic taste produced, in the violent symptoms almost immediately occurring, and in the evacuations being more often mixed with blood. If death is produced quickly, the symptoms closely resemble those of cholera; if several days elapse before death, the symptoms are more like dysentery, with violent tenesmus and shreddy, blood-mixed mucous discharges (Taylor, *Medical Jurisprudence*).

In poisoning by corrosive sublimate, death may not take place for several days. Such cases invariably show a *total inactivity of the renal organs* due to acute nephritis, in which, while the whole kidney is congested and glomeruli are inflamed, the most characteristic feature is necrosis of the tubules. Death usually occurs in from 1 to 5 days, though it may occur earlier or later, having been known to take place in less than 1/2 hour. The smallest dose known to have killed (a child) is 3 grains; it is thought that from 3 to 5 grains or less will kill an adult (Taylor). Death may occur from the external application of the drug to tumors, ulcers, etc.; and serious symptoms have followed from the use of the solutions even when the skin is unbroken.

In the bodies of persons, who, during life had employed mercury or some of its preparations, either internally or externally, metallic mercury has been found, as in the bones, brain, pleura, liver, cellular tissue, lungs, kidneys, etc. It has also been detected in the secretions of patients who were under its influence, as in the perspiration, urine, saliva, bile, gastro-intestinal secretions, and in the fluids of ulcers.

The salivation and gangrenous inflammation of the mouth occasioned by mercurials are best overcome by astringent infusions, as tincture of myrrh, both taken internally and used as a gargle, and the administration of chlorate of potassium. Its constitutional effects are best remedied by vegetable alteratives with iodide of potassium, tonics, attention to the excretions, exercise, etc.; though it is rarely the case that a perfect recovery of health ensues where the system has suffered considerably from the effects of the mercury.

In the treatment of cases of poisoning by corrosive sublimate, the antidotes must be given promptly, without the least delay. Give the white and yolks of eggs, well beaten with water; milk, or a mixture of wheat flour, oat-meal, or barley-meal, and water; these form a compound whose chemical action on the tissues is slight when compared with that of the poison. One egg is said to be required for every 4 grains of corrosive sublimate swallowed. The above, as well as mucilaginous drinks, should be given freely until relief is afforded; and as soon as possible the stomach should be evacuated by the stomach-pump, and subsequently be well washed out. Chemical antidotes, or those which decompose the poison, or form harmless compounds with it, should also be used. Recently the sulphide of calcium (Wilm's Antidote) has been introduced as an antidote to the slow poisoning by mercuric chloride, with a varying degree of success; and a combination of sodium phosphite, grs. 6, and sodium acetate (Carter's Antidote), has been successfully used. After the poisonous symptoms have been overcome, any inflammation which may remain must be treated on general principles.

Eclectics and Mercury.—The object of introducing into this book mercury and its salts is to show the small use of them in our practice, and the therapeutic values that have been placed upon them by our physicians: as well as to give a record of their effects for historic purposes and a knowledge of their poisonous action and treatment.

It is the common impression among those not of our faith in medicine that the use of mercury in any of its forms is proscribed in the Eclectic

school. As a matter of fact, one of the cardinal principles of Eclecticism now, as heretofore, is the liberty to use medicines of any kind and from any source, provided they do good and specific service in the treatment of the sick. Bending to authority has never been a practice with Eclectics, whose independence in thought and action has always been conspicuously characteristic. For this they were ejected from the folds of the dominant school, and this it was that gave birth to Eclecticism. Never, we assert, did the teachers and writers of our school, who in any sense may be regarded as leaders, proscribe the *use* of mercury. It was the *abuse* of it that was fought. It is true that there have been some who have felt it their duty to make a war of extermination upon the mercurials, but those few were inconspicuous as compared with the great mass of practitioners who only viewed with alarm the baneful effects of the drug when promiscuously and lavishly employed. In this connection let us recall the assertion published by us a few years ago, and emphasize it by its reproduction here:

"Mercury and its preparations have been little employed by Eclectic physicians, and have even been absolutely proscribed by many members of the Eclectic school. While it is true that the use of the drug has been discouraged by the teachers and writers of our school, it is also true that their ground of opposition is well taken, for these are drugs so pernicious in their effects, as ordinarily employed, that their abuse should be strongly guarded. They should only be used when the specific indications for their employment can be unmistakably pointed out. Therefore it is desirable that we reiterate what has been declared again and again by the *leaders and teachers* of the Eclectic school, that it is not the *use*, but the *abuse* of mercury to which objection is made. The earlier Eclectics, many of whom would not use mercury in any form, sought to find substitutes for the mercurials (as with podophyllin, etc., for hepatic disorders), for, as stated by King in the original preface to the *American Dispensatory* (page 8), 'there is no single remedy known to man which has produced a greater amount of mischief by its *indiscriminate* use than mercury; nor is there any other drug which has done one-hundredth part as much to create a prejudice against scientific medicine, to destroy the confidence of the community in its practitioners, and to repel them from the physicians to the nostrum dealer.' That the Eclectic fathers were justified in their objections to the viciously injudicious employment of mercurials prevalent in regular medicine in the early days of our school, is now evident from the position taken by many of the most conspicuous old-school authors of to-day, and by the very conservative use of the drug at present by old-school physicians, as well as by their kindlier feelings toward their professional rivals, whose opinions relating to some practices and problems in therapy do not agree with their own."

"Corrosive sublimate is little used by Eclectic practitioners, either as an internal or external remedy. Nor is its use as extensive among practitioners of the dominant school as it was some years back. In fact, in reviewing the old-school works upon practice and materia medica of the past and present, one is struck with the comparative conservatism in the use of these preparations as compared with former times."

In the dominant school mercury has four chief uses—(1) as an antisyphilitic; (2) as a purge; (3) as an antiseptic; and (4) as an antiphlogistic. All Eclectics do not deny its antisyphilitic action, but generally deplore its destructive action upon the body. They sometimes use it as a germicide, but never as a purge nor as an antiphlogistic.

Therapy.—*External.* Externally corrosive sublimate is antiseptic and germicide. It destroys pediculi, and in the form of solution or ointment is sometimes employed in parasitic skin affections, in acne, pityriasis, chloasma, freckles, and pruritus vulvæ. In the treatment of wounds, and in general surgical, gynæcological, and obstetrical manipulations, it is almost never used. The solutions employed for general antiseptic purposes should never be stronger than 1 in 2000. Solutions of 1 to 10000 in vaginal injections during operations have produced violent toxic effects. Death has resulted from solutions of 1 to 1500 employed in surgical operations. Many fatalities have occurred from its employment even in dilutions of 1 to 6000, when used in the peritoneal cavity and in other operations on the viscera. Used in this way it frequently produces albuminuria. For these reasons, corrosive sublimate solutions are fast being discarded by the few of our school who adopted them a few years ago and they are now very rarely used by Eclectic surgeons.

Externally, solutions of corrosive sublimate have been advised as a collyrium (1 to 1000 to 1 to 10000), in various affections of the eye, as ophthalmia neonatorum, acute catarrhal conjunctivitis, phlychtenular conjunctivitis, keratitis, xerosis, trachoma, lachrymal blenorrhœa, and hypopyon keratitis (Foltz). Corneal opacities have resulted from its local use. Washes (1 to 1000 to 1 to 4000) have been recommended in suppurative otitis media, furuncles, diffuse otitis media, and in operations for mastoid disease. A wash composed of solutions of borax and corrosive sublimate is asserted signally useful in the treatment of cracks, fissures, and other sores affecting the face, corners of the mouth, behind the ears, etc., in children.

Yellow Wash (*Lotio Flava*) is sometimes used as an application to venereal, scrofulous, and phagedenic ulcers. When employed, it should be well shaken and used in the turbid state.

Internal. Internally, corrosive sublimate has been employed to some extent by Eclectic physicians. Scudder, who opposed its use chiefly because of the lack of discrimination on the part of physicians, believed that if rightly studied, mercury might fill a valuable place in medicine, but only in chronic diseases (*Specific Medication*, page 179). He stated that if he were administering it, he would be guided by the small, contracted, elongated, and pointed tongue, of natural or more than usual degree of redness, with prominent papillæ. The urine should be of normal specific gravity, depositing no sediment, the lips of good color, the circulation good, and the skin elastic. He declared the mercurials were contraindicated by a pale mouth and tongue with absence of papillæ, pale and full fauces, tonsils, and palate, shiny red spots over the tongue, pallid, expressionless face, full lips, and increased secretion of saliva.

Webster advocates the use of corrosive sublimate 3 x (adults) to 6 x trituration (children), in 2-grain doses every 2 or 3 hours, for its effects upon

the mucous membrane of the colon, the vitality of which has been impaired by long-continued inflammation in chronic cholera infantum and dysentery. Ulcers of the colon and rectum form, the evacuations are semipurulent, and convalescence lingering. He claims that it lessens the pain and tenesmus, checks the evacuations, and restores normal energy to the parts. The ordinary doses of mercuric chloride range from 1/16 to 1/8 grain. The dose preferred by Webster is 2 grains of the 3 x trituration for adults, and of the 6 x trituration for children. Foltz employed 1/100 to 1/60 grain doses in syphilitic eye disorders. In ear disorders he advised it internally in 1/200 to 1/100 grain doses in syphilitic suppurative otitis media, and in internal ear affections.

Therapy of Other Salts of Mercury.—*Calomel. External.* Calomel forms an excellent topical application in corneal ulcer of a sluggish character. It should be freely dusted upon the lesions. Phlyctenular conjunctivitis may be similarly treated. Foltz warns us that it should not be used when corneal ulcers are forming, or when they are enlarging. He uses calomel to provoke irritative action in superficial corneal opacities, thereby inducing reparative action. Calomel is a good application in syphilitic chancre and chancroid, particularly the latter. Scudder employed it in such lesions when the sores were pale and coated with a pultaceous secretion. Dose of calomel for specific effects, 2 or 3 grains of the 3 x trituration, 3 times a day. The use of calomel internally or locally is contraindicated while taking iodide of potassium, lest it be converted into iodide and iodate of mercury.

Internal. Calomel is seldom used in the Eclectic practice as a purgative, though some employ it in 1/10 grain doses with 1/2 grain of sodium bicarbonate followed by a laxative, as an intestinal antiseptic in the bowel disorders of children. In minute doses it has been recommended by Webster (*Dynamical Therapeutics*), in lethargic states characterized chiefly by a long-continued tired feeling, associated with marked diurnal drowsiness and nocturnal wakefulness. The patient, though apparently in good health, awakens tired in the morning, is averse to exertion of any kind, and retires at night still tired, and the drowsiness is of such a pronounced character as to require much effort to remain awake. Such a condition, he states, often follows malarial infection, though he does not consider that it depends upon such a cause. The trouble must be idiopathic and not dependent upon "sympathetic local trouble". The dose is 2 or 3 grains of the 3 x trituration, 3 times a day.

Ammoniated Mercury (Hydrargyrum Ammoniatum) or White Precipitate is sometimes used in the form of a mild ointment for parasitic skin diseases, especially tinea; also occasionally in dry eczema and psoriasis of a chronic type. It is especially serviceable in impetigo contagiosa, and is very rarely used in ophthalmia tarsi. It is now rarely used in Eclectic practice, but is a constituent of the once popular old Eclectic Ophthalmic Balsam.

Nitrate of Mercury (Mercurous Nitrate). In Eclectic practice Brown Citrine Ointment was advised by Scudder and others in chronic eczemas, sycosis, barber's itch, and in some cases of pruritus (*Specific Medication*).

Biniodide of Mercury (Red Mercuric Iodide, Hydrargyri Iodidum Rubrum). Mercuric iodide is an active poison, nearly as powerful as corrosive sublimate. This is the preparation usually selected by Eclectic physicians when a mercurial is to be employed in constitutional syphilis, and in cutaneous, ocular, and aural affections, depending on a syphilitic taint. Its use was particularly advocated by Howe. The minute doses are usually preferred. The indications are those given under mercuric chloride (which see). In diseases of the eye, of syphilitic origin, as in syphilitic iritis, it has given results when iodide of potassium has failed. Similar results are obtainable in keratitis, choroiditis, choroido-retinitis, etc. Locally, it has been employed chiefly as Panas' solution, as in incipient trachoma, and in phlyctenular and catarrhal conjunctivitis. This solution (mercuric iodide 1 part, absolute alcohol 400 parts, and distilled water 20000 parts) is sometimes employed as an irrigating fluid for use previous to operations upon the eye, as in iridectomy, removal of cataract, etc. Diseases of the internal and middle ear, when of specific origin, often yield to the judicious use of this drug.

A solution of it, 6 grains to a fluidounce of distilled water, has been used as a lotion to scrofulous and syphilitic ulcers, etc.; a weak ointment in obstinate ophthalmia tarsi, with thickening of the meibomian glands. Mercuric iodide may be administered in pill, trituration, or in solution in alcohol, or ether, to be administered in water. The dose ranges from 1/1000 grain to 1/4 grain, the doses of 1/200 to 1/60 grain usually being preferred by our physicians.

Protiodide of Mercury. Sometimes used by those who favor mercurials in syphilis. Webster advises the 3 x trituration (dose, 2 or 3 grains) for its specific action upon the larynx to relieve hoarseness and croup. (*Dynamical Therapeutics*, page 407).

Yellow Oxide of Mercury is not employed as an internal medicine, but is valued by us as a local application especially in ocular and aural therapeutics. For ciliary blepharitis the ointment is probably the best local application, especially in chronic cases. The dried scales should be softened and removed by means of an alkaline wash, as of potassium bicarbonate, and the lids dried. Then the ointment should be thoroughly applied to the margins of the lids. If too strong, marked irritation and conjunctival hyperæmia may be produced. Foltz states that in phlyctenular keratitis in children it is indicated in nearly all cases (Webster's *Dynamical Therapeutics*). The ointment is also advised in corneal maculæ, indolent corneal ulcers, conjunctival granulations, xerosis, episcleritis, and pannus. Foltz declares it of negative value in suppurative otitis media, but has obtained good results from its use to heal the tympanic lesion after the cessation of the discharge. ℞ Yellow Oxide of Mercury, gr. xxx, Petrolatum ʒj. Mix. An ointment containing 2 per cent each of the yellow oxide and morphine sulphate in connection with dry heat is reputed efficient in the early stage of furuncular inflammation of the external auditory canal.

HYDRASTIS.

The dried rhizome and roots of *Hydrastis canadensis*, Linné (Nat. Ord. Ranunculaceæ). United States and Canada in rich, shady woods. (Chiefly Ohio, Indiana, Kentucky, and West Virginia.)

Common Names: Golden Seal, Yellow Root, Yellow Puccoon, Orange Root.

Principal Constituents.—Three alkaloids: *berberine* (yellow); and *hydrastine* and *canadine*, both white.

Preparations and Derivatives.—1. *Specific Medicine Hydrastis. Dose*, 1 to 30 drops.
2. *Colorless Hydrastis* (Lloyd's). *Dose*, 1 to 15 drops. Largely employed locally.
3. *Hydrastine Muriate* (Hydrochlorate of Berberine). A yellow powder. *Dose*, 1 to 5 grains.
4. *Hydrastin* (Resinoid), not now used.
5. *Hydrastin* (Combined Hydrastin). Only substance now sold as *hydrastin.*
6. *Hydrastina*, Hydrastine. (Alkaloid, both natural and synthetic.) Permanent white or creamy crystals or powder, almost insoluble in water; soluble in chloroform; less so in alcohol. *Dose*, 1/12 to 1/3 gr.; average dose, 1/6 grain.
7. *Hydrastinæ Hydrochloridum*, Hydrastine Hydrochloride (Hydrastine Chloride). White or cream-colored powder, odorless, hygroscopic, very soluble in alcohol and water. *Dose*, 1/12 to 1/3 grain; average dose, 1/6 grain.
8. *Hydrastininæ Hydrochloridum*, Hydrastinine Hydrochloride (Hydrastinine Chloride). Odorless, light-yellow crystals or powder, very soluble in water and alcohol. *Dose*, 1/4 to 1 grain; average dose, 1/2 grain.
9. *Liquid Hydrastis* (non-alcoholic). *Dose*, 1 to 20 drops.

Specific Indications.—Catarrhal states of the mucous membranes unaccompanied by acute inflammation (except in acute purulent otitis media); relaxed tissues, with profuse secretion of thick and tenacious yellowish or greenish-yellow muco-pus; relaxation and ulceration of tissues of mouth and throat; imperfect recovery from diarrhœa or dysentery, with mucous discharges and relaxation; aphthæ, ulceration, or erosion of mucous surfaces; atonic gastric irritability; irritation of mucous surfaces, with feeble circulation; muscular soreness aggravated by pressure; passive hemorrhages from the pelvic organs; ice water dyspepsia; skin diseases depending upon gastric wrongs which also indicate hydrastis.

Action.—Extensive experiments by pharmacologists show that Hydrastis alkaloids, particularly hydrastine, are actively poisonous to certain animals, producing spinal convulsions followed by paralysis, lowered blood pressure succeeded by a marked rise, and death. Upon man, however, no so-called physiological effects of any moment have been observed. In the ordinary medicinal doses it certainly is not a poison to human beings. No cerebral effects have been observed in either animals or man; and judging from clinical effects it probably increases contraction of special non-striated muscles, as it controls uterine hemorrhage in women and has an

ecbolic effect upon the lower mammals. Schatz explains this by asserting its power upon the unstriped fibers of the arteries and denying its effects upon other tubular muscular structures. It has also been assumed, but not experimentally proved, that it slightly increases hepatic secretion in man.

Therapy.—*External.* Hydrastis is one of our most efficient topical medicines when applied in disorders of the mucous membranes; and is occasionally of service upon the skin. It is of most importance perhaps in ophthalmic practice, being a thoroughly effective subastringent and soothing agent in acute and subacute catarrhal and follicular conjunctivitis. For this purpose, and indeed for most topical effects, the colorless preparations are preferred. Lloyd's Colorless Hydrastis in particular is to be commended, for it is both non-staining and non-alcoholic and has almost completely replaced the formerly used hydrastin and berberine preparations. The same medicament may be used in superficial corneal ulcer, ciliary blepharitis, and in simple trachoma. While signally useful in these affections of the eye appendages, hydrastis is of no value in intraocular disorders.

Inspissated cerumen may be readily softened by colorless hydrastis, thus facilitating its removal by water. It also controls the irritation of the aural canal when due to the presence of hardened wax. Eczema of the external auditory canal has been cured by it. In both acute and chronic otitis media it may be employed hopefully when there is a purulent or mucopurulent discharge and granulations do not exist.

Hydrastis preparations are among the most successful remedies in catarrhs of the nose and throat. It should be used both locally and internally in catarrhal and follicular pharyngitis, subacute forms of simple catarrhal sore throat following tonsillitis, subacute rhinitis, naso-pharyngeal and retro-pharyngeal catarrh, and in ulcerated naso-pharyngeal passages. It sometimes aids in the cure of syphilitic ulceration of the upper breathing tract. For catarrhal hypertrophy and engorgement of the turbinates it is often effective. The abundant discharge and thickened Schniederian membranes will guide to its selection. Locke advised it for nasal catarrh with thick, tenacious mucus and almost constant frontal headache. When thick gelatinous masses from the pharyngeal vault constantly drop into the throat, causing hacking cough and nausea, hydrastis given internally and as an ingredient of a local wash gives very satisfactory results. In all catarrhal affections of the upper respiratory tract, hydrastis should be administered for a prolonged period to obtain the best results. Hydrastis is valued by some as a topical reducer for chronically enlarged tonsils, but like most medicines recommended for that purpose it fails far oftener than it succeeds.

Hydrastis is universally admitted to be a most valuable topical agent in gonorrhœa. It is best adapted after the first and acute stage has passed, though it is not contraindicated at any time during the course of the infection. The preparation preferred is the colorless, though other hydrastis preparations, particularly berberine and hydrastin salts are useful, but objectionable on account of their staining qualities. Zinc sulphate increases the usefulness of the drug and quicker results can be obtained by instituting the treatment with a single irrigation with some mild silver salt, in order to destroy the gonococci. Care should be had not to use either

the silver or zinc compounds too strong or too freely lest stricture be produced. The great advantage of the hydrastis treatment alone is that, while perhaps slower, it never produces and probably prevents stricture. Hydrastis is especially valuable in the late stage of gonorrhœal urethritis, popularly known as gleet.

Leucorrhœa, both vaginal and uterine, is well treated with washes containing hydrastis, with or without the addition of indicated cleansing and astringent agents. It heals cervical erosion, which is frequently the source of the abnormal secretion. Jeançon valued it locally for this purpose and to remove light papillary vegetations. As there is usually relaxation and debility, some form of hydrastis should be given internally at the same time. Locke praises hydrastis as a wash for ulceration of the bladder due to chronic cystitis.

Hydrastis preparations are effective in skin disorders depending upon gastro-intestinal debility, with imperfect digestion. Here the local use should be accompanied by its internal exhibition. Such disorders as sluggish cutaneous ulcers, acne, eczema of the scrotum, and eczema of the anus and marginal area, and other orifices of the body come under its influence when used in this manner. It is commonly employed locally to give tone to the rectal tissues, being especially useful in prolapse of the rectum and sometimes relieves non-ulcerating hemorrhoids. In fissures of the anus, rectal ulcers, and proctitis it is a very painful application, and unless very carefully used and in small amounts it may provoke the very conditions sought to be relieved by it. Such conditions readily rebel against continuous stimulating and tonic treatment when irritability and sensitiveness are pronounced.

In most conditions, save those of the conjunctiva, hydrastis gives the best topical results when also administered internally.

Internal. Clinically hydrastis is known to stimulate the salivary, gastric, and intestinal secretions, and, to a slight extent, that of bile. It certainly has a most decided action on mucous surfaces, and is one of the most effective of bitter tonics. It sharpens the appetite and promotes digestion. Disorders of a subacute character and atonic states with increased flow of mucus are the types benefited by hydrastis. It is preeminently a mucous membrane remedy, allaying irritation when present, toning relaxation and correcting catarrhal tendencies. It should be considered when subacute and chronic inflammation with free secretion are present. For aphthous stomatitis it is equaled only by coptis and phytolacca; and is then to be used in the less active forms bordering on chronicity. For gastric irritability it is one of our best remedial resources, but should not be used when the stomach is acutely inflamed. The more the tendency toward chronic debility with oversecretion the more effective is hydrastis. It first relieves the irritation, then restrains the secretions, and finally gives tone to the gastric membranes. Without question it is our best single drug for chronic gastric catarrh, or so-called chronic gastritis. In that form due to alcoholic abuse, in which occurs the morning vomiting of drunkards, with disgust for food and craving for stimulants, hydrastis, with or without capsicum and nux vomica, gives incomparable results. In this aftermath of chronic alcoholism success attends this treatment in just so far as the

patient may be prepared to take and assimilate nourishment. Usually the hydrastis is more efficient with capsicum, and the latter may be given in liberal quantities of beef soup or other easily digested food regularly administered. Bartholow, one of the great therapeutic authorities of his time, and one who was largely responsible for the introduction of hydrastis and other Eclectic medicines into the materia medica of the regular school, went so far as to declare that in sufficient doses of the tincture or fluid-extract hydrastis is probably the best substitute for alcoholic beverages when it is desired to abandon the use of spirituous stimulants. Small doses of specific medicine hydrastis are indicated in that form of dyspepsia accompanied by the belching of putrescent gases, and followed by weakness or sense of "goneness" at the pit of the stomach. It also relieves an unpleasant distress just below the sternum, amounting almost to an internal itching and causing one to constantly shift or contract the muscles of the epigastric region. This condition is largely due to gastric irritation with distention by gases, and is promptly relieved best by colorless hydrastis, although the specific medicine is effective. When irritability is marked in stomachal debility small doses of the fluid preparations are to be preferred, but when there is but little irritability larger doses may be used, or hydrastin or berberine salts may be given immediately after meals. Specific medicine hydrastis, or Lloyd's colorless hydrastis, both in doses of 10 drops before meals and at bedtime, are the best agents we have employed in ice-water dyspepsia, a peculiarly American complaint due to the immoderate use of iced drinks and ices. For gastric ulcer no treatment should be considered without a fair and generous trial of hydrastis, geranium, and bismuth subnitrate. In the treatment of stomach disorders with hydrastis or its derivatives, the fact must be kept prominently in mind that it is only in conditions of atony, with gastric irritability or subacute inflammatory symptoms, with increased secretion, that the drug is of any benefit. Acutely inflamed tissues, so far as the gastro-intestinal tract is concerned, absolutely prohibit its employment.

Hydrastis, though most effective in gastric disorders, is valuable in certain affections of the accessory digestive organs. It is of unquestioned worth in catarrhal states of the intestines and gall duct, in duodenal catarrh aggravated by neighboring biliary concretions, and in chronic constipation due to debility and imperfect action of the intestinal glands. Its use must be persisted in for a long period. It is a serviceable tonic for enfeeblement of the gastro-enteric tract of infants and children, as well as adults, and offers support in convalescence from severe and depleting intestinal discharges, debilitating stomach and bowel disorders, the prostration occasioned by fevers and other acute affections, and hemorrhage. It is asserted of value in hepatic congestion. It is a question, however, whether it has any marked specific action upon the liver proper, and that benefit, if any, derived from it in hepatic disorders is largely due to its salutary effect upon the duodenum and bile duct and its properties of a general tonic.

Hydrastis controls passive hemorrhage. It is not adapted to copious active hemorrhages, as gastric and post-partum hemorrhages, but in those forms only of renal, uterine, or pulmonary bleeding in which small quantities

of blood are passed at a time and are recurrent in form. It is adapted to and is successful in rare cases to restrain bleeding and to reduce the size of uterine fibroids, and similarly in uterine subinvolution. In passive hemorrhages occurring in virgins and during the climacteric it is distinctly useful. Good results have followed its intercurrent use in congestive dysmenorrhœa, menorrhagia, and metrorrhagia, chiefly functional in character. It is a comparatively slow-acting drug in most forms of hemorrhage, but its effects are permanent.

Hydrastis, locally to relieve pain and retard growth, has been advised in carcinomata, particularly mammary cancer. While its general alterative and tonic properties and control over circulatory engorgement may make it a desirable general or supporting agent in carcinomatous cachexia, it is folly, in the light of present-day knowledge of this malignant scourge, to hope for any appreciable results from hydrastis, certainly not for a cure.

HYOSCYAMUS.

The leaves and flowering or fruiting tops of *Hyoscyamus niger*, Linné (Nat. Ord. Solanaceæ). Europe; naturalized in waste places in the United States. *Dose*, 2 to 10 grains.

Common Name: Henbane.

Principal Constituents.—Two alkaloids: *Hyoscyamine* ($C_{17}H_{23}NO_3$), probably identical with duboisine (from Duboisia) and daturine (from Stramonium); and *hyoscine* (*scopolamine*) ($C_{17}H_{21}NO_4$).

Preparation.—*Specific Medicine Hyoscyamus. Dose*, 1/10 to 20 drops.

Derivative. *Hyoscyaminæ Hydrobromidum*, Hyoscyamine Hydrobromide (Hyoscyamine Bromide). *Dose*, 1/200 grain.

Specific Indications.—Nervous irritability, with unrest and insomnia; dilated pupils and flushed face, accompanied by debility; fright and restlessness in sleep; night terrors; loquaciousness; garrulousness; destructiveness; busy muttering delirium, or singing, talkativeness, amusing hallucinations and illusions, particularly in fevers; choking sensations; the insomnia of debility, exhaustion, or insanity; the excitability of the insane; urethral irritation in the feeble, with urging to urinate; rapid, palpitating heart action; muscular spasms; spasmodic pain; sharp, dry nervous cough, aggravated by the recumbent position. A remedy to relieve pain, spasm, and nervous unrest in the aged and the infant, and in the anemic and the debilitated.

Action.—The physiological actions of hyoscyamus, belladonna, stramonium, and duboisia are quite similar, differing chiefly in degree and less in quality. They produce the same dryness of the throat, flushing of the face, dilatation of the pupils, quickening of the respiratory and heart action, illusions, hallucinations and delirium. While the alkaloids of these drugs also act in the same general manner, there are shades of difference which make some variation in effects. Thus hyoscine (scopolamine) acts somewhat as a check upon its associated hyoscyamine in the parent drug, the latter alkaloid being more closely allied to atropine in action. This check upon the latter makes hyoscyamus less excitant and less furiously deliriant than its congeners and it is less likely to cause cerebral hyperæmia. Under hyoscyamus the primary stimulation observed under belladonna and stramonium and their alkaloids may be absent, or at least it is of very much shorter duration and subdued character, so that under its influence

sleep is induced without much previous excitement. This is of great advantage in the treatment of the insane.

There is little observable difference between atropine and hyoscyamine upon the mechanism of ocular accommodation, but the latter sometimes fails to produce mydriasis. There is also but little variation in their effects upon the heart or breathing. Scopolamine (hyoscine), however, is said to cause stronger mydriasis and more quickly than atropine, though it is of shorter duration. Hyoscyamine is more hypnotic and less deliriant than atropine, but this is probably due to the presence of hyoscine in commercial hyoscyamine. It is well-established knowledge that scopolamine is more depressant to the higher cerebral centers than either hyoscyamine or atropine, and that even smaller amounts act decidedly as a hypnotic. Hyoscyamine acts more powerfully upon the peripheral nerves, hence hyoscyamus is a better agent than belladonna to combine with cathartics to lessen griping and tormina. Moreover, it does not restrain secretion and is likely to prove more or less laxative.

Great care must be observed, however, in the use of hyoscine and hyoscyamine. The former, in particular, in large doses dangerously depresses respiration, and if in any case it must be given in full doses its effects upon breathing should be closely watched.

The symptoms of poisoning by hyoscyamus and its alkaloids are sufficiently similar to those named under belladonna for diagnosis, and the treatment is the same as there recommended.

Therapy.—According to the dose in which it is administered hyoscyamus is a cerebral stimulant or a cerebral sedative. It is largely used under conditions in which opium would be indicated, but is not acceptable on account of the constipation, nausea, and headache induced by it. Hyoscyamus does not, like opium, restrain secretion, and proves laxative rather than constipating. Hyoscyamus is a safer drug for old persons and children than belladonna or opium. As a remedy for pain it is relatively far weaker than the latter, but should be preferred in mild attacks and especially in such when associated with spasmodic tubular contractions.

Hyoscyamus is the remedy for nervous irritability and irritation (small doses), and mental excitation with great motility (large doses).

Hyoscyamus allays spasm and relieves pain. It is a better agent for spasmodic disorders and peripheral pain than belladonna, but less effective than opium. Where it can be made to control the pain, however, it should always be preferred to the latter. Hyoscyamus is a better remedy for spasm, especially tubular and sphincteric spasm, than for pain, but if the latter is caused by the former it is doubly efficient. It cannot be relied upon, however, for very severe paroxysms of either pain or spasm such as attend bad cases of calculi colic—either biliary or renal. But it does very well in the milder attacks. In all painful and spasmodic conditions it takes rather full doses, except in states characterized by nervous irritation with feeble circulation—in other words, in nervous depression rather than in nervous excitability—; then small doses act specifically. Properly selected according to this depression or the contrary, and in doses to meet each condition, it is extremely useful in spasmodic dysmenorrhœa, flatulent colic, gastrodynia, spasmodic bowel disorders, painful hemorrhoids, spasmodic cystic

pain, spasmodic asthma, and whooping cough. As a remedy for pain it will usually be found to meet depressed conditions best. Hence its value in nervous headache, the headache of debility, the vague pains of so-called chronic rheumatism, idiopathic neuralgia, visceral pain, urethral pain, and that of herpes zoster. The more these cases show nervous irritation, weak circulation, tendency to anemia, and constant but not violent unrest, the better they are helped by small doses of the drug.

Hyoscyamus quiets that form of irritability akin to pain but not amounting to actual pain, such as irritation of the bladder and urethra with tendency to sphincteric spasm. Here nerve force is low and under similar conditions it relieves the ever-annoying urging to urinate accompanied by tenesmus that is so often associated with diurnal as well as nocturnal incontinence of urine, and in the cystic troubles of the aged and women during the menopause. In combination with camphor it has long held a reputation for the relief of nervous erethism produced by the passage of instruments into the urethra.

Cough, whether occurring in acute or chronic disorders, is controlled by hyoscyamus. The more spasmodic or convulsive the better it acts, though for some reason it is not as effective in whooping cough as stramonium, solanum, or belladonna. Probably none of these agents act any too well because there is some causative factor other than spasm, probably of a bacterial character. It relieves the short, dry, explosive cough of bronchitis. It relieves most irritable dry coughs, nervous cough, and harassing bronchial cough, caused or made worse upon lying down. It may be given for long periods, preferably in syrup of wild cherry, to relieve the cough and nervousness and thus promote rest in phthisis. In most of the forms of cough mentioned medium doses must be employed, except where nervous and physical depression is very marked. Hyoscyamus, in the small dose, is often the best agent to use in pneumonia, with dry cough and sub-delirium with widely dilated pupils.

Hyoscyamus is one of the most important agents in nervous and mental diseases. In the small doses it meets the depressive types; in full doses the excitable and furious manias. One of the chief uses of the drug (usually in this instance, hyoscyamine, or perferably hyoscine) is to produce sleep in acute mania. If of the violent, furious and destructive type, with great mental and motor excitability, full doses of hyoscine should be given. But if of the sub-delirious or mildly aberrative form, the smaller doses of hyoscyamus are to be preferred. Often both drugs fail to overcome the insomnia, in which instance wider wakefulness ensues and the patient paces the floor until the effect of the drug is spent. Full doses are usually required in delusional insanity, epileptic mania, recurrent mania, and puerperal mania —all with sleeplessness and great mental excitement. On the contrary when in such disorders as nymphomania following childbirth, and due more to delirium than to passion, and in puerperal mania, in both of which there is a feeble pulse, exhaustion, continuous but mild mental agitation, and nervous unrest, then small doses of the parent drug give the best results. Small doses of hyoscyamus are also to be preferred in the insanities, and in the delirium of acute diseases, when the patient indulges in singing, continuous talking, or low muttering delirium, or when garrulous and quarrelsome, but not violent.

When insomnia depends upon mere excitability, or when it is needed to relieve restlessness and unpleasant dreams during sleep, small doses of hyoscyamus are splendidly effective. These conditions often occur during the acute diseases of children and are promptly met by the drug. For the wandering delirium of exhaustion—the typhomania of typhoid fever, it is often the best calmative we can employ. The patient feels that he is away from home and friends and constantly asks and makes an effort "to go home". In hysteria with frequent voiding of small quantities of urine hyoscyamus should be given in fractional doses.

If it is borne in mind that all of the solanaceæ in true therapeutic doses produce effects opposite from those of their gross physiologic action, it will not be difficult to apply them specifically. If strong sedation is needed, the large doses are to be given; if stimulation, the small doses. For violent maniacal excitement the alkaloids are preferable: for mild forms, hyoscyamus.

Hyoscine is sometimes used in attempts to cure the opium habit. For the violent excitement following the complete withdrawal of the drug it is useful, but it should not be given continuously. It should be regarded here as an emergency remedy and so employed. It is an easy matter to permanently damage the intellect with the powerful solanaceous alkaloids. (See also *Scopolaminæ Hydrobromidum*.)

HYPERICUM.

The leaves and flowering tops of *Hypericum perforatum*, Linné (Nat. Ord. Hypericaceæ). Europe and America.

Common Name: St. John's Wort.

Principal Constituents.—Volatile oil, a resin, tannin, and *hypericum red*, a resinous red coloring principle.

Preparation.—*Tinctura Hyperici*, Tincture of Hypericum (herb, ℥viij; Alcohol, 76 per cent, Oj). *Dose*, 1/4 to 30 drops.

Specific Indications.—Spinal injuries, shocks, and concussions; throbbing of the body without fever; spinal irritation, eliciting tenderness and burning pain upon slight pressure; spinal injuries and lacerated and punctured wounds of the extremities, with excruciating pain; hysteria. Locally as a vulnerary.

Action and Therapy.—*External.* St. John's Wort is valued by many practitioners as a vulnerary, much as arnica is employed. Therefore it has been used extensively as a local application to bruises, contusions, sprains, lacerations, swellings, ecchymoses, and in acute mammitis.

Internal. Hypericum is said to be diuretic and sedative, and as such has been used in chronic urinary disorders, particularly suppression of urine. It undoubtedly has a strong influence upon the nervous system. Used according to the indications named above, many physicians believe it useful to relieve the painful effects of spinal concussion, shocks, etc., and to prevent tetanic complications. It will take pretty strong proof to convince most practitioners of the present day of any such virtue as true antitetanic properties in this simple drug. The internal uses as given above are based chiefly upon homœopathic symptomatology, and the drug has gained little favor in the Eclectic school of practice. It has, without question, a value in nervous disorders and should be more fully studied and tested, but miraculous powers should not be hoped for from it.

ICHTHYOLUM.

Ichthyol, Ammonium Ichthyol, Ammonium Ichthyol Sulphonate.

A sulphur-bearing preparation derived from a bituminous mineral, containing fossilized remains of prehistoric sea life. Tyrolese mountains of Europe.

Description.—A reddish-brown, syrupy liquid, with a bituminous taste and odor. It mixes readily with fats and petrolatum, and is soluble in water, partly dissolved by alcohol and ether, and wholly soluble in them when the two are mixed. It contains about 10 per cent of sulphur. *Dose*, 1 to 20 minims.

Action and Therapy.—*External.* Ichthyol has been used as a local application for almost every possible skin lesion imaginable, but has finally come to be valued mostly in a few acute inflammatory conditions, in which it seems to act with great force and efficiency. Thus it is preferred by many over all other topical agents for erysipelas. It quickly relieves pain and burning and limits the spread of the infection. Applied to acutely inflamed joints, as in acute articular rheumatism, it proves anodyne and sedative, and appears to hasten the reduction of the swelling and mitigate the severity of the inflammation. Ichthyol is also used in chronic skin diseases when thickening of the true skin takes place, as in acne, eczema, psoriasis, old ulcers, lupus and keloid. It may be applied to contusions, sprains, chilblains, frost bites, burns and scalds, intertrigo and urticaria, and in lymphatic and tonsillar swellings, with more or less relief. Many gynecologists employ it as a suppository or ointment for the absorption of pelvic exudates, especially those occurring around the uterus. While water-solutions of ichthyol are sometimes employed, for most purposes mentioned above, an ointment of 20 to 25 per cent of ichthyol with petrolatum, or preferably wool fat, is preferred. Ichthyol is not used internally in Eclectic therapeutics.

IGNATIA.

The seed of *Strychnos Ignatia*, Lindley (Nat. Ord. Loganiaceæ). Philippine Islands. *Dose*, 1 to 2 grains.

Common Name: St. Ignatius Bean.

Principal Constituents.—*Strychnine* and *brucine*, the former predominating; and *igasuric acid.*

Preparation.—*Specific Medicine Ignatia.* 1/20 to 5 drops. (*Usual method of administration:* ℞ Specific Medicine Ignatia, gtt. v to xv; Water, f℥iv. Mix. Sig.: One teaspoonful every 1 to 3 hours.)

Specific Indications.—Atony and nervous debility; (see also below.)

Action and Therapy.—Ignatia acts very much like nux vomica and may be used in conditions similar to those benefited by it. As it contains a considerable amount of brucine, it is thought to have a distinctive field in medicine. The specific guide for ignatia is *atony and nervous debility.* From the views of those who believe it superior to and even different in action from nux vomica we have outlined the following conditions in which it is said to be effective: General nervous atony; disposition to grieve; congestive headache; deep-seated, dull, dragging pain in the loins and back, or right hypochondrium; hysterical, choreic, epileptoid, or hypochondriacal manifestations arising from general nervous and muscular debility; muscular twitchings, particularly of the face and eyelids; dullness of the special senses, particularly asthenopia, and of hearing; wandering pelvic pains; sexual frigidity; dysmenorrhœa, with colic-like pain and heaviness of the womb; coldness of the extremities, with burning of the

soles of the feet. It will be observed that many of these symptomatic guides are derived from homœopathy. Observing the indications applicable it is believed useful in atonic dyspepsia, gastralgia, sick headache, disorders of the female reproductive organs, and nervous depression with pain. Though the composition of ignatia is similar to that of nux vomica, there may be a different molecular constitution in the two drugs, accounting for the varying shades of therapeutic activity ascribed to the two medicines.

IMPATIENS.

The plants *Impatiens pallida*, Nuttall; and *Impatiens fulva*, Nuttall (Nat. Ord. Geraniaceæ). Moist shady places and rich soils in the United States.

Common Names: Balsam Jewel Weed, Balsam Weed, Jewel Weed, (1) Pale Touch-Me-Not, (2) Speckled Touch-Me-Not.

Preparation.—The bruised, fresh plant.

Action and Therapy.—*External.* Refrigerant and sedative. The fresh juice of the crushed Impatiens gives prompt relief in the dermatitis of rhus poisoning if used early. It also quickly relieves the intolerable stinging produced by nettles. As these plants usually grow contiguously the balsam can be procured and applied at once. The relief is almost magical. The bruised plants may also be used to relieve the pain of acute engorged hemorrhoids.

INULA.

The root of *Inula Helenium*, Linné (Nat. Ord. Compositæ). A common roadside and pasture weed in Europe and America. *Dose*, 1 to 60 grains.

Common Names: Elecampane, Scabwort.

Principal Constituents.—Resins, *inulin* (30 to 40 per cent), a starch-like body, and *helenin* (Alant camphor).

Preparations.—1. *Specific Medicine Inula. Dose*, 1 to 60 drops.

2. *Syrupus Inulæ*, Syrup of Inula, (Specific Medicine Inula, fl ℥j; Syrup, Oj). *Dose*, 1 to 4 fluidrachms.

Specific Indications.—"Cough of a teasing and persistent character accompanied by substernal pain and profuse excretion; atony of abdominal viscera with engorgement and relaxation; catarrhal discharges." (*American Dispensatory*, 1900.)

Action and Therapy.—Inula is an aromatic, stimulating expectorant and tonic. It is one of the old but neglected remedies of early domestic and eclectic development, and has recently been revived as a remedy of promise in chronic pulmonic disorders. As it acts kindly upon the stomach, it proves tonic and favors digestion and assimilation. It seems especially adapted to chronic disorders with excessive mucous discharges. It has long been valued in chronic catarrhal states of the bronchi, bladder, and vagina, and particularly in chronic endometritis with discharge of glairy mucus. It relieves some cases of humid asthma and controls night sweats.

Inula is of greatest service in bronchial irritation, with cough of a persistent, teasing character, with copious expectoration. We have for many years used and valued the syrup advised by Locke, and prepared as follows: Take Elecampane, ℥j; Boiling Water, Oj. Boil until but 8 ounces remain; add 1/2 pound of white sugar. This is especially useful in chronic bronchitis, with profuse excretion of mucus or muco-pus, and in the cough persisting after la grippe and the severest forms of colds.

From time to time reports have come to press that helenin and other constituents of inula are fatal to the tubercle bacillus. In 1900 we recorded in the *American Dispensatory* the statement that "helenin is accredited with a fatal action upon the tubercle bacillus by Korab, Blocq, and others." Locke, in his lectures, emphasized the value of Inula in phthisis, and noted particularly its value to control the night sweats of that disorder. This was recorded in Locke's Syllabus in 1895. More recently, since hypodermatic and intravenous medication have come into vogue, inula, together with echinacea, has been reinvestigated and advised as a potent drug for its influence upon pulmonary tuberculosis. This work is still in the experimental stage, but with promise at least of amelioration of symptoms and gain of weight in some cases and a marked lessening of cough and secretion. Over-enthusiastic reports must be received with judgment, and not too much hoped for until more complete knowledge of its power over tuberculosis is proved or disproved. The value of the drug, internally administered, so far as amelioration of distressing symptoms is concerned, is unquestioned, but so far we are skeptical concerning its power to destroy the tubercle bacillus within the body.

IODOFORMUM.

Iodoform, Triiodomethane. (Formula: CHI_3.)

Description.—A lemon-yellow powder or shining crystals; slightly sweetish, iodine-like taste; and a peculiar offensively penetrating odor, clinging to fabrics and receptacles for very long periods. It dissolves in chloroform or ether, less readily in olive oil, alcohol, or glycerin, and very slightly in water. *Dose*, 1/2 to 5 grains.

Preparation.— *Unguentum Iodoformi*, Iodoform Ointment (10 per cent). This should usually be diluted for most purposes.

Action and Toxicology.—Ordinarily when applied to sound or to broken skin, wounds, ulcers, and mucous membranes, iodoform is nonirritating and acts as a topical anæsthetic. When given internally in average doses, or as ordinarily employed externally, little effect is produced upon the active processes of life, but when used in excessive amounts upon wounded surfaces, as in cavities, it has produced serious toxic symptoms and even death. Some persons are more susceptible than others, and the aged more so than younger adults and children.

Occasionally local poisoning occurs from dressings of iodoform, an erythematous, papular, or eczematous eruption being caused, and sometimes vesicles filled with an orange-colored serum. Contrary to formerly accepted views iodoform is not fatal to germ life, organisms seeming to lose none of their activities in its presence. When in contact with moist wounds, however, iodine is liberated and this may have some antiseptic effect. Apparently secretions are restrained and the wounds dessicated by absorption by iodoform dressings, and in this way surgical results of value have been obtained from their use. Iodoform is slowly eliminated in the urine as iodide and iodate of sodium with some free iodine, and in the saliva as sodium iodide.

Moderate doses of iodoform occasion headache, nausea and vomiting, and the unpleasant taste and odor of the drug become intolerable. The olfactory sense is also perverted. Large doses occasion vertigo, restlessness, and insomnia, with quickened pulse, almost amounting to tachycardia, and a sharp rise in temperature of several degrees. The patient shows great

anxiety, mental confusion, and depression which progresses into melancholia with hallucinations, followed by a delirium and maniacal excitement, disproportionate in duration and intensity to that occasioned by any other drug. Finally hæmaturia or anuria, sphincter paralysis, collapse, and death ensue. Maniacal delirium is the most characteristic feature of the majority of cases, though in some there is an absence of cerebral excitement, and drowsiness, stupor, coma, cold, livid skin, and collapse come on at once. Death takes place through simultaneous paralysis of heart and lungs. Fatty degeneration of the viscera is the most pronounced post-mortem finding.

In treatment of iodoform poisoning the drug should be withdrawn at once. If from local application the parts should be washed with alkaline carbonate solutions or bromide of potassium. Sodium bicarbonate should be given for internal poisoning, together with bromide and acetate of potassium, or lemonade.

Therapy.—*External.* Notwithstanding the assertion that iodoform is not a germicide its value as a surgical dressing is unquestioned and it is still employed by many operators. Its abominably persistent odor has been its greatest drawback, coupled with its occasional poisoning from absorption. Several substances have been incorporated with it to destroy or to mask its odor, with more or less success. Among these may be mentioned oils of camphor, eucalyptus, clove, cinnamon, bergamot, thyme, lavender, sassafras, and peppermint; and camphor, thymol, and cumarin. The odor may also be removed from the operator's hands by means of a solution of tannic acid, flaxseed meal in water, vinegar, chloroform, or ether, or by first putting a few drops of turpentine on them and then washing with soap and water.

According to the purpose desired, iodoform is used pure as a dusting powder (not over 30 grains at a time); or as advised by Locke (iodoform 100, thymol 1, sugar of milk 200); or in glycerinated lotion (iodoform 1, glycerin 4). Murrell advised a good mixture (iodoform, ℥j; oil of eucalyptus, fl℥j; soft and hard petrolatum, aa ℥ijss). Olive oil solutions (10 to 25 per cent) are employed in cavities; collodion solutions (5 to 10 per cent) for wounds; and carbasus iodoformata or iodoform gauze (10 to 50 per cent) for dressings, packing, and drainage. Suppositories, bougies, and other ways have been devised for applying it for special purposes. Ointments usually carry from 5 to 10 per cent of iodoform.

Iodoform is an efficient dressing for simple, gunshot and infected wounds, and for abdominal operations involving the peritoneum and intestines and the pelvic organs of woman. For soft chancres it is still largely used, as well as for painful, syphilitic phagedena, many preferring it to other dessicants in spite of its odor. It cannot well be employed in private practice because of this "give away" quality. It is one of the best applications to tuberculous ulcers, and the oil emulsion is largely employed in tubercular caries.

Iodoform benumbs rectal sensibility, and is therefore a most useful agent to incorporate in ointment or suppository for the relief of pain in rectal ulcer or fissure, in painful hemorrhoids, to relieve pruritus, and to render defecation painless. There is no better obtunder in tubercular,

syphilitic and cancerous ulceration of the rectum to allow the patient to have painless evacuations and to give rest to the parts.

Formerly iodoform was used in a variety of aural and ophthalmic disorders with hypersecretion and fetid odors, and in ozæna and syphilitic ulcers of the nasal region. Other agents lacking odor have supplanted it for these purposes. Occasionally it is still employed by insufflation in laryngeal phthisis. The formula of Murrell is an effectual one: ℞ Iodoform, Boric Acid, aa ʒij; Menthol, gr. x; Calcium Phosphate, q. s. ʒj. All in very fine powder. Mix. A 4 per cent solution in turpentine has also been inhaled with relief in laryngeal and pulmonary tuberculosis and in bronchiectasis. From 3 to 5 drops may be used at a time.

Internal. Iodoform is scarcely ever employed internally as formerly, when it was thought that it would prove a potent remedy in tubercular, syphilitic, strumous, and other infectious diseases. It is scarcely needful to say that it has proved wholly disappointing for these purposes.

IODOLUM.

Iodol, Tetraiodopyrrol.

A derivative of pyrrol through its interaction with iodine in the presence of alcohol. (Formula: C_4I_4NH.)

Description.—A pale, grayish-brown, crystalline powder, odorless and tasteless; soluble in alcohol, ether, and fixed oils, and chloroform (105); almost insoluble in water. *Dose*, 1 to 4 grains.

Action.—Iodol has a quite superficial caustic action, leaving on ulcerated surfaces a whitish pellicle. It is rather slowly absorbed, and for that reason has been preferred to iodoform, for which it was introduced as a substitute. It has an advantage over the latter in possessing no odor, and is said not to produce coryza nor stomatitis. Large doses cause poisonous symptoms like those of iodoform, and its prolonged use has occasioned fatalities, fatty degeneration of the visceral organs preceding. Iodol is decomposed in the body and passes in the urine as iodides.

Therapy.—*External.* Iodol has been advised in powder, gauze, ointment (10 per cent), bougie, etc., as a substitute for iodoform, being safer because less rapidly absorbed. A 10 per cent collodion solution has been employed to abort erysipelas. The powder is also insufflated for the relief of tubercular laryngitis.

Internal. The powder, in doses of 5 to 30 grains a day, has been advised in lieu of potassium iodide, in the tertiary stage of syphilis.

IODUM.

Iodine.

The nearly pure element iodine (Symbol I).

Description.—Heavy, brittle, bluish-black scale or plate-like crystals, volatilizing at the ordinary temperatures. The taste is acrid, and the odor distinctive and persistent. It imparts an evanescent stain to the skin. It is soluble in alcohol, less readily in glycerin, and very sparingly in water. It dissolves freely in chloroform or ether, or in water to which iodides have been added. *Dose*, 1/50 to 1/10 grain.

Preparations.—1. *Tinctura Iodi*, Tincture of Iodine. (Contains, according to U. S. P., about 7 per cent of iodine and 5 per cent of potassium iodide.) *Dose*, 1 to 3 minims.

2. *Liquor Iodi Compositus*, Compound Solution of Iodine (Lugol's Solution—5 per cent iodine; 10 per cent potassium iodide). *Dose*, 1 to 5 minims.

3. *Unguentum Iodi*. Iodine Ointment (Iodine, Potassium Iodide, Glycerin and Benzoinated Lard). For external use.

Action and Toxicology.—Iodine stains the skin and is a pronounced but slowly acting irritant. Its effects penetrate quite deeply. After a thorough application the cuticle usually exfoliates. The excess of iodine may be removed by alcohol, and the coloration by sodium hyposulphite or by ammonia water. Iodine is rapidly absorbed, appearing in the urine very shortly after being swallowed and in the sweat and the milk, always as hydriodic acid or as other iodides. A nursing infant may acquire iodism from the milk of its mother taking iodine or its salts. The internal effects of iodine are not well known. Under its use better nutrition results, but it is not thought that it directly assists in bloodmaking or in stimulating nutrition. The good effects probably arise from its alterative action, which materially assists in the removal of worn-out tissues—in other words, it increases "retrograde metamorphosis". Long continued use of iodine may induce wasting of the testicles and the mammary glands, conditions which may be permanent, or from which recovery may take place after a long period.

In large doses iodine is a violent irritant poison, producing gastro-enteritis. Acute pain, vomiting and purging, great thirst, strong metallic taste, profuse salivation, rapid and feeble pulse, death-like pallor and complete anuria are the chief symptoms of acute iodine poisoning. Prostration is profound and death results from respiratory paralysis. If death does not take place shortly it may be delayed for several days, when it occurs from the severe inflammation and fatty degenerative changes.

In poisoning by iodine, starch is the chemical antidote. It should be given with the emetic and freely afterward. Flour paste may be used if starch is not at hand. Preferably the starch should be scalded with boiling water and then diluted with cold water, so that the union of iodine and starch can more easily result in the production of non-toxic iodized starch. External heat should be applied and respiration and circulation sustained by such stimulants as alcohol, ammonia, ether, digitalis, strychnine, caffeine, or atropine. A milder form of poisoning occurs from excessive doses of iodine and the iodides, or from their prolonged use, or in susceptible individuals. It is known as *Iodism*. (See *Potassii Iodidum*.)

Therapy.—*External.* Tincture of iodine is one of the best of local irritants and absorbents, and is also antiseptic and antipruritic. Within recent years it has come into great prominence as an agent for sterilization of the skin previous to operations. Even large areas, as the whole abdominal surface, are subjected to this precaution. Water should not be previously applied as it lessens the penetrability of the antiseptic. Painted upon the parts in this manner it renders the field of operation absolutely aseptic. Iodine is now used to prevent infection arising from scalp wounds and crushed fingers, where all sorts of dirt, hair, grease, and other débris are ground into the tissues. It should be painted freely upon the parts and swabbed into the injured tissues. It may also be used upon poisoned wounds and snake-bites.

Tincture of iodine may be painted upon swollen and painful surfaces, and used to reduce engorgement in adenitis. A good method is to paint the tincture around the swelling, while the ointment is used within the circle. This should be done early, when it may prevent the formation of pus.

If pus has already formed it will do no good. Iodine may be painted upon synovitis, in which it may at first seemingly aggravate. But subsequently resolution is hastened by it. It is also useful to stimulate absorption in chronic arthritis and to reduce swelling or alleviate pain in chronic muscular rheumatism, in chronic neuritis, and in muscular chest pains not involving the pleura or the intercostal nerves. Painted upon the upper chest region it sometimes relieves the persistently hacking cough of chronic bronchitis or laryngitis and removes the muscular soreness attendant upon coughing. It may also be applied to tender points of the chest wall in phthisis to remove the soreness.

Iodine destroys soft and spongy granulations, and stimulates repair in old tibial ulcers. It may also relieve pain and limit swelling and destruction of tissue in boils, carbuncles, felons, and buboes. Applied to frost bites, chilblains, and non-suppurating bunions it gives great relief; the ointment or solution in collodion is to be preferred. For maceration of the skin, with soreness between the toes, whether due to tissue contact or of parasitic origin, iodine is one of the best of applications. It causes a little smarting, but that soon passes away, the skin exfoliates and the parts are healed. Iodine is one of the surest parasiticides in skin disorders of the ringworm type, in favus, and has given fair results in psoriasis. Painted upon and around the inflammatory area in erysipelas it limits the invasion of the infection. There is no special advantage in the use of iodine upon sprains and contusions unless effusion has taken place. In that event it hastens absorption and resolution.

Iodine may be used cautiously upon spongy gums with loosening of the teeth. We have seen unpleasant sores follow such applications. A very weak, watery solution should be used, if any. It serves a better purpose for the reduction of chronic indurations of the cervix uteri.

Injections of iodine into cysts, purulent cavities, etc., is inadvisable, as too many dangerous results have followed such a procedure. It is, however, still used by some who retain barbarous methods as an irritating injection for the cure of hydrocele. It cures by producing inflammatory surfaces which, in healing, obliterate the cavity.

In applying iodine the tincture should be painted upon the part until the skin is thoroughly saturated, and then not repeated until desquamation and complete healing take place. Under no circumstances should it be painted upon denuded surfaces, except the slight denudation between the toes above referred to. For glandular swelling the ointment is preferable to the tincture. The vapor of iodine is sometimes employed in diphtheria and respiratory affections, but not much good is accomplished thereby.

Internal. Iodine as an internal medicine has been largely supplanted by the metallic iodides and the syrup of iodide of iron. It is, however, occasionally administered in states of perverted nutrition when of a strumous type and marked by adenopathy. Only in slow and sluggish conditions is it admissible, and if the glandular inflammation or induration be active and inclined to suppurate iodine will aggravate the condition. Iodine should be given as close to meals as possible, and preferably in some bland oil or syrup, and the doses should always be small. While contraindicated in ordinary pulmonary tuberculosis, it is said to be useful in

so-called "fibroid phthisis". The status of iodine medication in goitre is still a matter of study, most cases of the exophthalmic type probably being due to some disturbance caused by the natural iodine in the tissues. The preponderance of opinion seems to point to limiting its use to cases of goitre with simple hypertrophy of the connective stroma, and that it is harmful in the cystic and vascular forms. Scudder favored the use of the following in sexual debility: ℞ Tincture of Iodine, gtt. xx; Simple Syrup, fl℥iv. Mix. Sig.: One teaspoonful after meals and at bed time.

IPECACUANHA.

The root of (1) *Cephaelis Ipecacuanha* (Brotero), A. Richard, or of (2) *Cephaelis acuminata*, Karsten (Nat. Ord. Rubiaceæ). Brazil and other parts of South America. *Dose*, 1 to 20 grains.

Common Names: Ipecac, (1) Rio Ipecac, (2) Cartagena Ipecac.

Principal Constituents.—The alkaloids *emetine* ($C_{30}H_{44}N_2O_4$), *cephaeline* ($C_{28}H_{33}N_2O_4$), *cephaelic* (*ipecacuanhic*) *acid*, volatile oil, tannin, etc.

Preparations.—1. *Pulvis Ipecacuanhæ*, Powdered Ipecac. *Dose*, 1 to 20 grains. (Usual emetic dose, 10 to 15 grains.)

2. *Specific Medicine Ipecac. Dose*, 1/30 to 20 drops (for specific purposes the fractional dose is employed).

3. *Syrupus Ipecacuanhæ*, Syrup of Ipecac. *Dose*, 1 to 20 minims (expectorant); 2 to 4 fluidrachms (emetic).

4. *Alcresta Ipecac. Dose*, 1 tablet daily.

Specific Indications.—Irritation with long and pointed tongue, with reddened tip and edges, and accompanied by nausea and vomiting, with or without fever; irritation with increased secretions; irritation of stomach, bowels, bronchial tubes, bronchioles, and pulmonic air cells, and nervous system; irritative diarrhœa; dysentery, with the ipecac tongue; acute bowel disorders with increased secretion; hypersecretion of bronchial fluid with mucous rales (minute dose); diminished expectoration (medium doses); irritative cough, with or without dyspnœa; hoarseness from coughs and colds; hemorrhage; menorrhagia (medium doses); as an emetic when the stomach is overloaded or in foul condition, with broad, flabby and slimy tongue (full doses).

Action.—Ipecac, in material amounts, is irritant to the skin and mucosa. Applied by inunction it excites irritation, and produces vesicular and pustular eruptions and sometimes ulcers. When inhaled it causes heat and violent sneezing. In susceptible individuals the powdered drug excites pronounced attacks simulating asthma, the chief symptoms being great dyspnœa, with wheezing respiration and cough, and marked anxiety and prostration. This is often accompanied by violent and prolonged sneezing and spitting of blood, and followed usually by a free expectoration of mucus. In doses of less than 1 grain, ipecac is a gastric tonic and hepatic stimulant. Large doses (15 grains or more) are emetic. If emesis fails catharsis may result; or both emesis and purgation may be produced by it. Ipecac feces are peculiar—bilious and mush-like. From 3 to 10 grains of the powdered drug will cause nausea, with more or less depression of the pulse, languor, diaphoresis, and increase of mucous secretion. As an emetic it is fairly slow (15 to 20 minutes), active and thorough, causes much nausea and muscular straining, and the ejection of a large quantity of mucus. A state of tolerance may be established by the prolonged use of ipecac. Though said to have no appreciable effect upon the circulation, the therapeutic action of

small doses seems to controvert this statement, a stimulating effect accepted in Eclectic therapy as special sedation resulting.

Emetine has produced death by gastro-intestinal inflammation and cardiac paralysis.

Therapy.—The field of therapeutic activity of ipecac is restricted chiefly to the digestive and respiratory tracts, and to some extent to the blood vessels, acting as a hemostatic. It is decidedly irritant to mucous surfaces, particularly that of the nasal passages, and in some individuals will precipitate an attack simulating spasmodic asthma. It increases biliary activity, is expectorant in small doses, and emetic in full doses, and there is evidence that it possesses antiseptic qualities.

Ipecac is used chiefly for five great purposes: (1) In full doses as an emetic; (2) in small doses as a nauseant expectorant; (3) to check active hemorrhage; (4) to check vomiting; (5) and as employed mostly in Eclectic therapy, to control *irritation* and inflammation of the mucous passages of alimentation and respiration.

The chief specific indications are: (1) The full, broad tongue, heavily coated, with constant nausea or vomiting. Here it should be used in full doses as an emetic; (2) irritation of digestive tract, with long, pointed, reddened tongue and tendency to nausea, vomiting, diarrhœa or dysentery; (3) scanty expectoration, with irritative cough and hoarseness; (4) active hemorrhage.

The conditions demanding the specific use of ipecac are those showing *irritation*, *capillary engorgement*, and *hypersecretion*.

As an emetic ipecac is not suited for emergency cases, such as poisoning, if other more suitable and more rapid emetics can be procured. Zinc sulphate or apomorphine is more prompt and more certain in poison cases, especially narcotic poisoning. But for the purpose of relieving the stomach of its contents when overloaded, or when food is fermenting and undergoing faulty digestion, and the tongue is heavily coated, the breath foul, and nausea or vomiting imminent, a full emetic dose of ipecac is justifiable and efficient. In this way it often relieves gastric distress and pain, being of very great value in acute indigestion, and checks bilious attacks with sick headache due to the causes mentioned.

One of the therapeutic facts long ago recognized by those whose eyes are not otherwise open to the utility of specific medication is that ipecac (though a common emetic), in very small doses, is one of the best of antiemetics. This is most easily accomplished when the tongue is red and pointed and shows evidence of irritation. There are other cases, however, in which the nausea depends upon foul accumulations in the stomach. The tongue is then broad, flabby, and slimy, and nausea is pronounced. In such instances a full emetic dose may be given, and if nausea and vomiting then persist it may be followed by minute doses. This usually is effective. Ipecac in small doses is one of the recognized agents of value in the nausea and vomiting of pregnancy.

Ipecac is often lost sight of as a remedy for active hemorrhage. Of course, it operates best where the quantity of blood lost is small. We have seen most excellent results follow its use in hemoptysis and in the hemorrhage from gastric ulcer. It should not be given in doses large enough to

cause emesis. In typhoid fever it is less valuable than carbo-vegetabilis or gallic acid, but may be used for the bloody discharges of dysentery. It may also be exhibited in nosebleed, hæmaturia and in menorrhagia, in the latter case often doing excellent service when given in a single full dose.

The greatest value of ipecac lies in its beneficient effect upon irritation of the gastric and intestinal mucosa. The long, pointed tongue, with reddened tip and edges, the uneasiness and pain, the tendency to diarrhœa and particularly to dysentery, and the disposition to nausea are so completely met by it as to give it prominence among the specific medicines for acute diseases of stomach and bowels. If there is fever, it should be given with the indicated sedative, usually aconite. It is especially a remedy for summer disorders of children. It, together with aconite and magnesium sulphate, forms the best treatment for acute dysentery with muco-sanguineous passages. For this purpose we have used it invariably and always with complete success.

Ipecac in large doses (20 to 60 grains), administered after a preceding dose of opium to produce sedation, is considered one of the most certain methods of meeting amœbic or tropical dysentery and preventing the subsequent formation of hepatic abscess. This is followed every four hours with twenty-grain doses, tolerance having become established until the peculiar mush-like ipecac stools are produced.

Ipecac finds a prominent place in acute gastric irritation, in gastric inflammation, in acute hepatitis, in enteritis, and particularly in cholera infantum of the irritative type. It is especially useful in acute mucous diarrhœa and in the diarrhœa of dentition. In all abdominal conditions requiring ipecac there is the characteristic tongue—long, with reddened tip and edges, and prominent papillæ. There is tenderness upon pressure, and the patient is noticeably irritable, and easily disturbed by noises. There is vascular irritability and marked hyperæsthesia. All the faculties are preternaturally acute and the patient extremely sensitive. In such cases no remedy will render better service than ipecac, given in small doses. Often there is the white line around the mouth, contraction of tissue, with pinched countenance; and even if there is no fever, there is a suggestion of approaching nervous explosion, so great is the hyperæsthesic condition of the little patient. In such instances it is decidedly calmative, relaxant and soothing; but the dose must be guarded to keep it below the nauseant point.

A new field for ipecac and its alkaloid particularly is the endamœbic infection, pyorrhœa alveolaris. The specific medicine may be used around the teeth or emetine injected; and it has been suggested that ipecac preparations form a part of the daily mouth wash. The use of alcresta ipecac has produced some remarkable results in pyorrhœa. However, it has become established that there are different types of pyorrhœa, and that the emetine treatment often fails, and its early reputation as a specific has not been sustained. Still it is the most useful treatment so far advised, and will be used until a better one can be devised.

Ipecac is used less, perhaps, as an expectorant in Eclectic practice than by members of the dominant school. Still, where there is a short, irritative cough, with lack of secretion (nauseant doses), and in cases with excessive secretion (stimulant doses), small doses of ipecac are decidedly useful.

It is also valuable in harsh, croupal cough and in explosive cough and in irritable conditions brought on by too frequent or violent use of the voice. Thus it finds a place in the treatment of common colds, bronchitis, bronchopneumonia and pneumonia, la grippe, and in the cough of measles. Taken internally and sprayed locally, it is one of the greatest remedies for hoarseness due to atony of the vocal cords, and for aphonia due to either irritation or atony of the vocal apparatus. It must not be expected to cure such conditions when due to a tubercular larynx, but many such cases may be temporarily ameliorated by such treatment. It is less valuable in croupous conditions than lobelia, but if used in the various forms of croup, emesis should be gradually (not suddenly) provoked by repeated moderate doses.

The dose of ipecac as an emetic is 15 to 20 grains, in plenty of warm water. For other purposes the following usual prescription may be used: ℞ Specific Medicine Ipecac, gtt. v to xv; Water, fl℥iv. Mix. Sig.: One teaspoonful every 2 or 3 hours, as indicated.

IRIS.

The rhizome and roots of *Iris versicolor*, Linné (Nat. Ord. Iridaceæ). Common in wet places in the United States. *Dose*, 5 to 20 grains.

Common Names: Blue Flag, Larger Blue Flag, Fleur de Luce.

Principal Constituents.—Volatile oil, a whitish-yellow resin, a trace of an alkaloid, and a comphoraceous body.

Preparation.—*Specific Medicine Iris. Dose*, 1 to 20 drops.

Specific Indications.—Enlarged, soft and yielding lymphatic enlargements; thyroid fullness; splenic fullness; chronic hepatic disorders, with sharp, cutting pain, aggravated by movement; clay-colored feces, with jaundice; nausea and vomiting of sour liquids, or regurgitation of food, especially after eating fats or rich pastry, or ice cream; watery, burning feces; rough, greasy skin, with disorders of the sebaceous follicles; abnormal dermal pigmentation.

Action.—Iris stimulates the glands of the body to increased activity and impresses the nervous system. In large doses it is emeto-cathartic, acting violently, the vomitus being acid and the catharsis watery and persistent and accompanied by colic and rectal heat. Iris increases the hepatic and pancreatic secretions, as well as those of the intestines. Iris also salivates, but without injury to the gums and teeth. Salivation from vegetable sialagogues may be differentiated from that caused by mercury by the absence of mercurial fetor and lack of sponginess of the gums or loosening of the teeth. Neuralgic pain is said to be produced by iris when given in large doses; and when even moderately full therapeutic doses are administered it produces a more or less persistent belly-ache and mild catharsis. Iris is capable of causing gastro-enteritis resulting in death. To be effective iris preparations must be made from prime, heavy, resinous root-stocks; when old and light, like tan-bark, iris produces neither physiologic nor therapeutic effects.

Therapy.—*External.* Specific Medicine Iris has been painted upon goitre with good results, though it is effectual in but few instances, and the type is not as yet well defined. It is also advised as an efficient local treatment for psoriasis, chronic itching eczema, various types of tinea, prurigo,

and crusta lactea. In all of the preceding disorders the drug should be given internally while being applied externally.

Internal. Iris is alterative and cholagogue. It exemplifies as fully as any drug the meaning of the term alterative as used in Eclectic therapy. Perhaps this is best expressed to-day by saying that it corrects perverted metabolism. Iris, in small doses preferably, quietly stimulates the glandular structures of the body, both the glands with outlets and the ductless glands. It promotes waste and excretion, two processes necessary before repair can well take place. In broad terms it is a remedy for "bad blood" and imperfect nutrition. The term "bad blood" or blood dyscrasia has, as a rule, little relation to the blood itself, but pertains chiefly to imperfect lymphatic elimination and faulty retrograde metamorphosis. Iris impresses the thyroid function, is of great value in the adenopathies of syphilis and skin affections, with imperfect functioning of the lymphatic system resulting in enlarged lymph nodes. Hepatic torpor, splenic fullness, and jaundice, with clay-colored stools are influenced for good by it, the drug acting quietly as an alterative when given in small and repeated doses.

Iris should be used in the various cachexias—lymphatic, scrofulous and syphilitic. It proves more or less useful in some cases of goitre or enlarged thyroid, whether the enlargement be constant, or merely the temporary fullness associated with the menstrual function, normal or abnormal. When it does good it is chiefly in reducing enlargement, and appears to have but little influence upon the tachycardia and other disturbances of hyperthyroidism. As a rule, *soft* glandular enlargements are best treated with iris, and hard enlargements with phytolacca. However, iris is sometimes surprisingly effective in goitre, while more often it seems to fail completely. The exact type most benefited has never been clearly defined. In order to obtain satisfactory results at all, the use of the drug must be continued over a period of several months. In exophthalmic goitre it may be given early, but without great hope of doing more than to affect the bodily glandular functions, thereby improving the general health of the patient. The same may be said for it in Addison's disease, in which it has sometimes benefited, but has not, of course, cured. Iris is often useful in splenic fullness, and ovarian and uterine turgescence in cachectic individuals.

Minute doses of iris relieve gastric irritation, with nausea, vomiting, and gastralgia. In like doses it is sometimes useful in cholera infantum, and in either diarrhœa or dysentery, both with large, slimy evacuations, repeated small doses have proved very effectual. Still for all these bowel troubles it is far inferior to ipecac. It is quite certain, however, to relieve sick headache dependent upon indigestion, and bilious headache, with nausea and sour and bitter vomiting, and clay-colored stools. In fact one of the most important uses for iris is in that complex condition included in the elastic denomination "biliousness". For regurgitation of fatty foods or pastries it is especially effective. In hepatic congestion, with constipation, and sharp-cutting pains, increased by motion, iris frequently gives relief. When constipation depends upon hepatic and intestinal torpor and in duodenal catarrh, with jaundice and clay-colored feces, iris should be considered as a possible remedy. Aching pain, with pressure beneath the scapulæ, usually dependent upon hepatic wrong, is relieved by 1 to 5 drop doses of specific medicine iris.

JACARANDA.

The leaves of *Jacaranda procera*, Sprengel (Nat. Ord. Bignoniaceæ). A tree of Guiana and Brazil.

Common Names: Carob Tree, Caroba, Caaroba.

Principal Constituents.—*Carobin, carobic acid*, several resins, a balsam, and tannin.

Preparation.—*Specific Medicine Jacaranda. Dose*, 5 to 20 drops.

Action and Therapy.—In its native habitat carob is reputed antisyphilitic, but has attained no such reputation in this country. A few, however, have used it for the late manifestations of syphilis, as eruptions and ulcerations. Watkins suggested its use in the epilepsy of masturbators and in those of feeble mentality with voracious appetite.

JALAPA.

The dried tuberous root of *Exogonium Purga* (Wenderoth) Bentham (Nat. Ord. Convolvulaceæ). A vine of Eastern Mexico. *Dose*, 10 to 30 grains.

Common Name: Jalap.

Principal Constituents.—A resin (*Resina Jalapæ*) composed chiefly of *jalapurgin* ($C_{62}H_{100}O_{32}$) (convolvulin or jalapin) and a soft acrid resin.

Preparations.—1. *Resina Jalapæ*, Resin of Jalap. Yellowish-brown or brown masses or fragments, or a yellowish-gray or yellowish-brown powder, permanent, of a faint but peculiar odor, and somewhat acrid to the taste. Soluble in alcohol. *Dose*, 2 grains.

2. *Pulvis Jalapæ Compositus* (U. S. P.), Compound Powder of Jalap. (Jalap, 35; Potassium Bitartrate, 65.) *Dose*, 20 to 60 grains. (Locke advises Ginger, ʒij, in ʒviij of this preparation to prevent griping.)

3. *Pulvis Jalapæ Compositus* (Eclectic), Compound Powder of Jalap (Eclectic), or *Antibilious Physic*. (Senna, ʒij; Jalap, ʒj; Cloves or Ginger, ʒj.) *Dose*, 60 grains (in hot water allowed to cool and then sweetened).

4. *Specific Medicine Jalap. Dose*, 5 to 20 drops.

Specific Indications.—Intestinal torpor and constipation from deficient secretion of the intestinal glands; pain and griping in the lower bowel.

Action and Therapy.—Jalap is an irritant cathartic operating energetically and producing large liquid stools. It gripes considerably and sometimes causes nausea and vomiting. Large doses produce violent hypercatharsis, sometimes resulting in death. It is a safe and thorough cathartic when no inflammation of the gastro-intestinal tract exists, and may be used where a derivative action, with full stools, is indicated. In small doses (5 grains daily) it may be employed to relieve constipation due to inactivity of the intestinal glands or where hard fecal masses are impacted in the rectum. Movements are facilitated by the secretion induced. It is a useful revulsive in cerebral congestion, and may be used in hemorrhoidal conditions with constipation when a stimulating cathartic cannot be employed.

The chief use of jalap is for the relief of *dropsy* from any cause. It is commonly used with cream of tartar, which increases both the cathartic and diuretic effects. It should not be given for any great length of time, for the depletion finally has a depressing effect upon the heart. Though contraindicated in inflammation of the intestinal tube, it may be used when there is inflammation of the biliary apparatus, and when a cathartic is needed at the onset of fevers. The Antibilious Physic and that modification of the compound powder as advised by Locke are desirable forms in which to use Jalap. Jalap alone purges in about 3 to 4 hours.

JEFFERSONIA.

The rhizome of *Jeffersonia diphylla*, Barton (Nat. Ord. Berberidaceæ). A handsome, vernal, flowering plant throughout the eastern half of the United States.

Common Names: Twinleaf, Rheumatism Root.

Principal Constituents.—A large proportion of an undetermined white alkaloid, *saponin*, and a trace of *berberine*.

Preparation.—*Tinctura Jeffersoniæ*, Tincture of Jeffersonia. (Jeffersonia, 8 ounces; Alcohol (76 per cent), Oj.) *Dose*, 10 drops to 1 fluidrachm.

Action and Therapy.—As indicated by one of its trivial names this plant has been used in chronic forms of rheumatism. Its exact status is not well determined, but it is undoubtedly alterative and has some effect upon the general nervous system, allaying excitability and irritability. Watkins declared it efficient in pain in the head with dizziness and feeling of tension. Locke mentions it as useful where rheumatism is located chiefly in the muscles of the back, and in bronchitis and constitutional chronic catarrh, especially in the aged.

JUGLANS.

The bark of the root of *Juglans cinerea*, Linné, collected in the autumn (Nat. Ord. Juglandaceæ). A forest tree of North America.

Common Names: Butternut, White Walnut.

Principal Constituents.—A fixed oil, and orange-yellow *juglandic acid*, a body closely resembling chrysophanic acid.

Preparations.—1. *Specific Medicine Juglans*. *Dose*, 1 to 30 drops.

2. *Extractum Juglandis*, Extract of Butternut. *Dose*, 1 to 30 grains (usually 1 to 5 grains).

Specific Indications.—Chronic constipation; gastro-intestinal irritation, with sour eructations, flatulence, and either diarrhœa or constipation dependent thereon; diarrhœa and dysentery with tenesmus and burning and fetid discharges; hepatic torpor; chronic pustular or vesicular skin disease, discharging freely; eczema.

Action and Therapy.—In small doses juglans is a mild intestinal stimulant and laxative; in large doses it is emeto-cathartic. It also possesses alterative properties. As a laxative its action is kindly, rarely producing griping or after-debility, and resembling that of rhubarb, but it does not produce subsequent constipation. Being a mild gastric stimulant it is often of service in gastric irritation and atonic dyspepsia, and in indigestion with deficient glandular secretion, sour eructations and flatulent distention. These conditions are often accompanied by a burning and tenesmic diarrhœal or dysenteric discharge. Laxative doses of juglans relieve the latter annoyances. A full laxative dose of extract of butternut was a favorite early-day treatment of malarial infection or "ague" in the western States, where the pioneers also used it successfully for rheumatic pain in the back—probably lumbago due to overloaded intestines. For these purposes it is now a neglected medicine.

Juglans has a specific action upon skin disorders of a pustular or vesicular type, and especially those that are eczematous or related in any measure to a strumous diathesis. The dose need not be sufficient to produce free bowel action, but should be large enough to induce some intestinal secretion. Small doses of the specific medicine (1 to 5 drops) are

best for this purpose. As a laxative the extract is preferable, in doses of 1 to 5 grains; sometimes up to 30 grains.

JUNIPERUS.

The fruit (berries) of the *Juniperus communis*, Linné (Nat. Ord. Coniferæ). An evergreen tree of Europe and America.

Common Names: Juniper, Juniper Berries.

Principal Constituents.—A volatile oil (*Oleum Juniperi*) and an amorphous body, *juniperin.*

Preparations.—1. *Infusum Juniperi*, Infusion of Juniper (Berries, ℥j; Boiling Water, Oj; let stand one hour). *Dose*, 2 to 4 fluidounces.

2. *Oleum Juniperi*, Oil of Juniper. Colorless, faintly green or yellow oil of the juniper taste and odor. It should be kept protected from light in amber-hued bottles and in a cool place. *Dose*, 2 to 15 minims.

3. *Spiritus Juniperi*, Spirit of Juniper (5 per cent oil). *Dose*, 5 to 60 minims.

4. *Spiritus Juniperi Compositus*, Compound Spirit of Juniper (Oils of Juniper, Caraway, Fennel, Alcohol, and Water). *Dose*, 1 to 4 fluidrachms.

Specific Indications.—Renal atony with catarrhal and pus discharges; non-inflammatory irritability of the neck of the bladder.

Action and Therapy.—Juniper is a gastric stimulant and a stimulating diuretic to be used in atonic and depressed conditions, usually in chronic affections of the kidneys and urinary passages with catarrhal or pus-laden discharges. It is especially valuable in renal atony in the aged, with persistent sense of weight and dragging in the lumbar region. In uncomplicated renal hyperæmia or congestion, when the circulation is weak and no fever or inflammation is present, the careful use of juniper will relieve, and if albumen is present it may disappear under its use. It is often of great value in chronic nephritis, catarrh of the bladder, and chronic pyelitis to stimulate the sluggish epithelia and cause a freer flow of urine to wash away the unhealthy secretions. It is sometimes of value after scarlet fever or in the late stages when the kidneys are not yet inflamed, and after acute nephritis when the renal tone is diminished and secretion of urine is imperfect. Under no circumstances should it be used when there is active inflammation. The infusion is extremely useful in irritation of the bladder with recurrent attacks of distressing pain and frequent urination in women during the menopause and apparently due to taking cold. The infusion of juniper is the best preparation for most purposes. A pint may be taken in a day. When an alcoholic stimulant is needed in the above-named condition the spirit or compound spirit may be used. The oil is often efficient in non-inflammatory prostatorrhœa and gleet. Juniper preparations are frequently exhibited in chronic structural diseases of the heart, liver, and kidneys, to stimulate the sound tissues to functionate and relieve the attendant dropsy. Usually they are combined with agents like citrate or acetate of potassium or with spirit of nitrous ether. In these conditions they must be used with judgment and caution. No preparation of juniper should be given in doses larger than recommended above, as suppression of urine, strangury, hæmaturia, or even uræmic convulsions may result from its use.

KALMIA.

The leaves of *Kalmia latifolia*, Linné (Nat. Ord. Ericaceæ). A beautiful shrub of mountains and damp situations in the United States.

Common Names: Mountain Laurel, Laurel, Sheep Laurel, Lambkill, etc.

Principal Constituents.—A neutral, poisonous principle, *andromedotoxin* ($C_{31}H_{51}O_{10}$), *arbutin*, resin, and tannin.

Preparation.—*Specific Medicine Kalmia. Dose*, 1 to 20 drops.

Specific Indications.—Fugitive rheumatic pains; aching pain in the back; pain upon movement of the eyeballs; excited circulation; cardiac palpitation reflex from gastro-intestinal irritation; chronic syphilitic cachexia.

Action and Therapy.—King valued kalmia in constitutional syphilis, with excited heart-action and rapid circulation. Being a sedative it is said to allay fever and inflammation, and it is credited with power to relieve symptoms due to cardiac hypertrophy. It is also a remedy for aching pain, shifting rheumatic pain, aching pain in the back during menstruation, and ocular pain upon movement of the eyes. Palpitation of the heart excited reflexly by gastro-intestinal disturbances is sometimes relieved by it. It is said to be most valuable when the disorders above mentioned are associated with a syphilitic taint. Kalmia has never obtained a very important place in medicine, though it possesses strongly toxic properties.

KAMALA.

The glands and hairs from the capsules of *Mallotus philippiensis* (Lamarck), Müller Arg. (Nat. Ord. Euphorbiaceæ). A small Asiatic, African, and Australian tree. *Dose*, 30 to 60 grains.

Common Names: Kamala, Kameela, Spoonwood.

Principal Constituent.—*Rottlerin* or *kamalin*, a crystalline principle.

Preparation.—*Specific Medicine Kameela. Dose*, 30 to 60 drops.

Action and Therapy.—In doses of 2 to 4 drachms kamala purges, with griping, nausea and vomiting, and the production of four to fifteen evacuations. The alcoholic preparations act more kindly and uniformly. Its chief use is that of a tænicide expelling the tape-worm entire, but with such force that the head sometimes remains. Full doses of the specific medicine should be given every three hours until five or six doses have been taken. It also expels lumbricoids and ascarides.

KINO.

The self-dried juice of *Pterocarpus Marsupium*, Roxburgh (Nat. Ord. Leguminosæ). A tree of the mountains of the Malabar coast of Hindustan. *Dose*, 10 to 30 grains.

Common Names: Kino, Gum Kino. **Synonym:** Resina Kino.

Principal Constituents.—*Kinotannic acid* (75 per cent), *kinoin*, *pyrocatechin*, *kino-red*, and gum.

Preparation.—*Tinctura Kino*, Tincture of Kino. *Dose*, 1 to 2 fluidrachms.

Action and Therapy.—*External.* Sometimes used as an astringent wash in soreness and relaxation of the uvula and the pharynx, and as an injection in leucorrhœa and gonorrhœa; also as a stimulating application to indolent ulcers.

Internal. A good astringent for pyrosis and chronic serous diarrhœa and that occurring in opium habitués, and in the diarrhœa of phthisis.

KOLA.

The seeds of *Sterculia acuminata*, Palisot de Beauvais (Nat. Ord. Sterculiaceæ). A tree of western Africa. *Dose*, 5 to 30 grains.

Common Names: Kola, Kola Nut, Female Kola, Cola, Bissy-Bissy.

Principal Constituents.—*Caffeine* (theine) 3 per cent, and a small amount of *theobromine*, kola-red, and kolatannic acid.

Preparation.—*Fluidextractum Kolæ*, Fluidextract of Kola. *Dose*, 5 to 30 drops.

Specific Indications.—Nervous and muscular depression with cerebral anemia.

Action and Therapy.—The physiological action of kola closely duplicates that of caffeine and the caffeine-bearing drugs. It is, therefore, a remedy for muscular and nervous depression due to cerebral and spinal anemia. It is useful in hysteria, mental gloom, neurasthenia, and the diarrhœa of debility. It may be used in acute alcoholism, but is of no value in chronic inebriation, and it sustains one attempting to break away from the tobacco-habit. It relieves nervous irritability of the stomach, often checking the nausea of pregnancy and the vomiting of seasickness. Its action in chronic diarrhœa must be due to its power over irritation, as there is not sufficient tannin in the drug to cause much astringency. Like caffeine it is useful in the neuralgia of debility, in migraine, smoker's heart, and cardiac irritability. These are all cases needing stimulation and of the cerebral anemic type. The chief indications for it are difficult breathing, irregular heart action, and valvular insufficiency. After long spells of illness it may be used when there is mental depression, tendency to faint, poor appetite and digestion, great nervous irritability, and profound muscular debility.

KRAMERIA.

The root of *Krameria triandra*, Ruiz et Pavon, and of *Krameria Ixina*, Linné (Nat. Ord. Polygalaceæ). Small suffruticose plants of South America and the West Indies. *Dose*, 10 to 30 grains.

Common Names: Rhatany, Ratanhia.

Principal Constituent.—*Ratanhia-tannic acid* (krameria-tannic acid), an amorphous red powder present to the extent of 8 to 18 per cent.

Preparations.—1. *Specific Medicine Krameria. Dose*, 10 to 60 drops.

2. *Extractum Krameriæ*, Extract of Krameria (Extract of Rhatany). *Dose*, 10 to 20 grains.

Action and Therapy.—*External.* Astringent and hemostatic. A splendid agent alone or with myrrh, for spongy and bleeding gums and to preserve the teeth. In ointment it is a good application for bleeding piles, and in ulcer of the rectum and fissure of the anus.

Internal. Tannin-bearing drugs often act better as astringents than tannin itself. Rhatany is one of these agents. It is powerfully astringent and somewhat tonic. Immoderate doses may induce constipation with slight dyspeptic symptoms. Internally it has been used in passive hemorrhage, mucous and serous diarrhœas, incontinence of urine, leucorrhœa, prostatorrhœa and colliquative sweating. It has been advised in the diarrhœa of opium habitués and in dyspepsia and gastric catarrh with full, relaxed skin.

LACTUCARIUM.

The dried or concrete milk-juice of *Lactuca virosa*, Linné (Nat. Ord. Compositæ). South and Central Europe. *Dose*, 5 to 20 grains.

Common Name: Lettuce Opium.

Principal Constituents.—*Lactucin* ($C_{11}H_{14}O_4$), *lactucerin* (lactucone), *lactucopicrin*, *lactucic acid*, and a comphoraceous volatile oil.

Preparations.—1. *Tinctura Lactucarii*, Tincture of Lactucarium, (50 per cent strength). *Dose*, 30 to 60 drops.

2. *Syrupus Lactucarii*, Syrup of Lactucarium (prepared from Tincture). *Dose*, ℥j to ℥iij.

Action and Therapy.—A non-constipating calmative and feeble hypnotic, sometimes proving useful in insomnia from mental overwork and, as a syrup, in the cough of phthisis. Even garden lettuce (*Lactuca sativa*) relieves irritation of the broncho-pulmonic membranes and has a tendency to induce drowsiness. Lactucarium is often inert; when a good preparation can be obtained it is fairly sedative for irritable children.

LAPPA.

The root and seeds of *Arctium Lappa*, Linné (Nat. Ord. Compositæ). Europe, Asia, and America. *Dose*, 5 to 60 grains.

Common Name: Burdock.

Principal Constituents.—The glucoside *lappin*, fixed oil, *inulin*, and an altered tannin called *phlobaphene*.

Preparations.—1. *Specific Medicine Lappa*. *Dose*, 1 to 60 drops.

2. *Tinctura Lappæ Seminis*, Tincture of Lappa Seeds. (Seed, ℥iv; 75 per cent Alcohol, Oj.) *Dose*, 1 to 60 drops.

Specific Indications.—Feeble cutaneous circulation; dry, scaly skin eruptions; aphthous ulcers; recurrent boils and styes; urinary irritation; psoriasis.

Action and Therapy.—Lappa is a potent but neglected alterative and diuretic. It relieves urinary and bronchial irritation, favors the elimination of waste material, and secondarily proves tonic. Lappa is especially valuable in psoriasis, crusta lactea, stubborn eczema, obstinate ulcers, and in catarrhal and aphthous ulcerations. It is one of the best of agents for recurrent boils and styes. Bronchial cough, with much irritation of the pulmonary tract, is relieved by it, and it is sometimes beneficial in dyspepsia due to irritation of the stomach in cachectic individuals. As it gently stimulates the kidneys and promotes waste it should be largely used in strumous and cachectic conditions, with tendency to dry, scaly, cutaneous eruption and low grades of cellular inflammation, with feeble circulation in the skin.

LAVANDULA.

The flowers of *Lavandula vera*, De Candolle (Nat. Ord. Labiatæ). Dry sterile soils of mountainous elevations in southern Europe and northern Africa; cultivated in the United States.

Common Names: Lavender, Lavender Flowers.

Principal Constituents.—A volatile oil (*Oleum Lavandulæ*) containing *linaolool acetate*, *linalool* ($C_{10}H_{18}O$) and *cineol* or *eucalyptol*.

Preparations.—1. *Spiritus Lavandulæ*, Spirit of Lavender (5 per cent oil). *Dose*, 10 to 60 minims.

2. *Tinctura Lavandulæ Composita*, Compound Tincture of Lavender. (Compound Spirit of Lavender.) (Contains Oil of Lavender, Oil of Rosemary, Clove, Myristica, Saigon Cinnamon, Red Saunders, Alcohol, and Water.) *Dose*, 10 to 60 drops.

Action and Therapy.—*External.* Spirit of lavender is an agreeable and soothing lotion for the headache of debility and in fevers. The compound tincture is frequently added to carbonate of ammonium, and constitutes "smelling salts" for the relief of headache and tendency to fainting.

Internal. Oil of lavender, the spirit and the compound tincture are delightful stimulants and carminatives. They are extensively employed to allay gastric uneasiness and nausea, in flatulent colic, hysteria, nervous debility, general languor and tendency to fainting. For nervous and weak individuals, who faint easily and are prone to hysterical seizures, they are simple and safe preparations. The compound tincture is added to many mixtures to give color, and all of the lavender preparations are used as corrigents and adjuvants of less agreeable medicines. Scudder valued the compound tincture in nervous irritability in children, and incorporated it in a "soothing syrup" described under *Cypripedium*, which see.

LEONURUS.

The tops and leaves of *Leonurus Cardiaca*, Linné (Nat. Ord. Labiatæ). Asia, Europe, and common in the United States.

Common Name: Motherwort.

Principal Constituents.—Resins, a bitter principle, and probably an alkaloid.

Preparation.—*Infusum Leonuri*, Infusion of Leonurus. (℥j to Water, Oj). *Dose*, 2 to 4 fluidrachms.

Action and Therapy.—A simple emmenagogue and antispasmodic, evidently having considerable control over the nervous system. It has been advised in nervous debility with irritation and unrest, tendency to choreic movements or spasms, pelvic and lumbar uneasiness and pain, and in bearing-down pains and the discomforts incident to debility of the female reproductive organs. A warm infusion may be used in amenorrhœa, and King praised it for the restoration of suppressed lochia. It deserves restudy to determine its value in nervous affections.

LEPTANDRA.

The rhizome and rootlets of *Veronica virginica*, Linné (*Leptandra virginica*, Nuttall), (Nat. Ord. Scrophulariaceæ). A tall perennial plant indigenous to the eastern half of the United States. *Dose*, 10 to 60 grains.

Common Names: Culver's Root, Black Root, Culver's Physic, Bowman Root, Tall Speedwell, etc.

Principal Constituents.—A resinoid called *leptandrin*, formerly used but now largely discarded by Eclectic practitioners, and a bitter principle.

Preparation.—*Specific Medicine Leptandra. Dose*, 1 to 60 drops.

Derivative.—*Leptandrin* (Resinoid). *Dose*, 1/4 to 2 grains.

Specific Indications.—Tenderness and heavy pain in the region of the liver, with drowsiness, dizziness, and mental depression; skin, yellow; tongue coated white; bitter taste, nausea, frontal headache and cold extremities; thirst with inability to drink; diarrhœa with half-digested passages, or clay-colored stools; enfeebled portal circulation, with lassitude, gloom, and mental depression.

Action and Therapy.—Leptandra is a gastro-hepatic and intestinal stimulant. The fresh root is viciously cathartic and has produced bloody stools and abortion. Drying, however, deprives the drug of its drastic

quality and it becomes a safe cholagogue, laxative, and cathartic. Apparently in ordinary doses it strengthens the functional activity of the intestinal glands, does not debilitate nor produce large stools, and if the circulation is feeble, with a tendency to stasis, it has a decidedly tonic effect.

Leptandra is a remedy for intestinal atony—especially duodenal atony associated with hepatic torpor. It has been employed in dysentery and chronic diarrhœa, dependent upon constipation of the upper bowel, or upon imperfect elaboration of the food. These cases are accompanied by dizziness, headache, visceral pain, mental depression and cold extremities. In atony of the stomach and liver with the preceding and the following symptoms it is decidedly stimulant and tonic. There is a dry, hot skin, with cold feet, abdominal plethora, pale, white coated or furred broad and thick tongue, heavy or dull aching in the hepatic region and the left shoulder, and a bitter, disagreeable taste. In fact with any of the preceding symptoms—and yellowness of the skin and conjunctiva and nausea, leptandra will prove very useful in atonic dyspepsia, acute hepatitis, acute duodenal catarrh, diarrhœa of half-digested aliment, muco-enteritis, and chronic enteritis. It will be evident from the guides given that leptandra is a remedy for the complex known as "biliousness". It aids chionanthus, and sometimes podophyllin to dissipate jaundice. In the early period of Eclectic medicine it was valued in typhoid fever, when ushered in with constipation and before marked involvement of Peyer's patches had become established. It is questionable whether any laxative should be resorted to in such conditions—an enema is to be preferred. But for pre-typhoid symptoms, not amounting to enteric fever, its use is justifiable and even beneficial. Leptandra is better as a laxative in malarial fever and prepares the system for the more kindly reception of antiperiodic medication. It is no longer employed in anasarca and ascites, better agents having supplanted it. It is a good medicine and its field of usefulness has narrowed down to gastro-hepato-duodenal atony, and attendant or resulting disorders, in which it proves an admirable stimulant and corrective. It acts well with hydrastis, podophyllum, chionanthus, dioscorea, or chelidonium when these are also indicated. It is especially valuable in the diarrhœa of dentition. The nervous irritability may be controlled with matricaria and the following administered: ℞ Compound Syrup of Rhubarb and Potassa, fℨiij; Specific Medicine Leptandra, fℨj. Mix. Ten to 20 drops every hour until the diarrhœa ceases. Glyconda may be substituted for the neutralizing cordial, if sugar is contraindicated.

LEUCANTHEMUM.

The whole plant of *Chrysanthemum Leucanthemum*, Linné (Nat. Ord. Compositæ). Introduced into America from Europe.

Common Names: Ox-eye Daisy, Field Daisy.

Principal Constituents.—Probably an acid, aromatic, volatile oil, and a bitter principle.

Preparation.—*Infusum Leucanthemi*, Infusion of Leucanthemum. *Dose*, freely.

Action and Therapy.—An infusion of leucanthemum is tonic and should be considered in cases of colliquative sweating in which it is not desirable to use the active antihydrotics, as atropine, muscarine, or camphoric acid.

LIATRIS.

The rhizomes of several species of *Liatris* (Nat. Ord. Compositæ). Middle and southern United States. *Dose*, 10 to 60 grains.

Common Names: Button Snake Root (L. spicata); Blazing Star (L. squarrosa); Gay Feather (L. scariosa); Deer's Tongue (L. odoratissima).

Principal Constituents.—Resins, volatile, bitter principle, and in some *coumarin* ($C_9H_6O_2$), a principle having a vanilla odor.

Preparation.—*Infusum Liatridis*, Infusion of Liatris (℥j to Oj). *Dose*, 1 to 4 fluidounces.

Action and Therapy.—This drug is stimulant, bitter tonic, diuretic, and emmenagogue. It is sometimes used as a gastric tonic in dyspeptic conditions associated with renal inactivity. Rarely it is used to relieve pain in spasmodic bowel complaints and colic in children, in backache in adults, and to relieve dysmenorrhœa. It is seldom employed. Button snake root derives its name from its traditional Indian reputation as a local alexipharmic (freshly-bruised root) for rattle-snake bite, a myth, it is needless to say, as yet unverified.

LIGUSTRUM.

The bark and leaves of *Ligustrum vulgare*, Linné (Nat. Ord. Oleaceæ). A beautiful shrub in woods and thickets in the eastern half of the United States; also cultivated. *Dose*, 10 to 60 grains.

Common Names: Privet, Privy, Prim.

Principal Constituents.—The glucoside *ligustrin* (syringin), a bitter crystalline body, *ligustron*, and an amorphous bitter, *syringopikrin*.

Preparation.—*Decoctum Ligustri*, Decoction of Privet (℥j to Water, Oj). *Dose*, 1 to 4 fluidounces.

Specific Indications.—Aphthous sore mouth; relaxed sore throat.

Action and Therapy.—*External.* Next to coptis the most useful application for thrush in infants and of value in pallid sore throat with tissue relaxation, and in aphthous sore mouth.

Internal. An astringent tonic of much value in ulcerative and catarrhal conditions of the mucous membranes of the stomach, bowels, and renal tract.

LILIUM.

The whole plant of *Lilium tigrinum* (Nat. Ord. Liliaceæ). Native of Japan and China, but largely cultivated.

Common Name: Tiger Lily.

Preparation.—*Specific Medicine Tiger Lily*. *Dose*, 1 to 10 drops.

Action and Therapy.—This remedy has been acquired from Homeopathy and is reputed slowly effective in controlling uterine irritation and congestion, being employed also to allay the nausea of pregnancy and of uterine irritability, in congestive dysmenorrhœa, and chronic ovarian neuralgia with darting, burning pain in the ovaries. It is also said to be of service when pelvic weight and prolonged lochia accompany a tardy recovery from parturition and in the bearing-down discomfort incident to prolapsus uteri.

LIMON.

The juice and outer rind of the fresh ripe fruit of *Citrus medica Limonum* (Risso), Hooker filius (Nat. Ord. Rutaceæ). Northern India, and cultivated in subtropical countries.

Common Name: Lemon.

Principal Constituents.—A pale-yellow or greenish-yellow, fragrant oil (*Oleum Limonis*); and a bitter principle, *hesperidin* ($C_{22}H_{26}O_{12}$).

Preparations.—1. *Limonis Succus*, Lemon Juice. This may be prepared by slightly boiling strained lemon juice to remove mucilage, etc., and pouring it into previously sterilized bottles filled to the neck; fill the neck with pure olive, sweet, or almond oil, and cork tightly. Keep the bottle in an upright position. This, while slightly bitter, will keep for several weeks. Another method is to add 10 per cent of brandy to the strained juice. *Dose*, 1/2 to 4 fluidounces.

2. *Limonis Coxtex*, Lemon Peel. A flavoring agent only.

3. *Oleum Limonis*, Oil of Lemon. Pale-yellow or greenish, having the taste and odor of lemon peel. If it has the odor of turpentine it should not be used. *Average Dose*, 1 to 5 minims.

Specific Indications.—Elongated, reddened tongue with prominent papillæ; scorbutus; fevers with red, long tongue; excessively red, inflamed surfaces in inflammatory rheumatism, with alkaline urine and long, red tongue, thinly coated white.

Action and Therapy.—Lemon juice and citric acid (see also *Acidum Citricum*) are the best known prophylactics and curative remedies for scurvy (scorbutus). The juice may be given in doses of 1/2 to 2 ounces a day as a preventive, and in doses of 2 to 4 ounces, three times a day, as a cure. The action of lemon juice and citric acid is not exactly identical, probably owing to the presence in the former of mucilage and citrate of calcium, but for most purposes requiring the acid, lemon juice is used and preferred. For preparation of the juice for long voyages, see above (*Preparations*). Diluted lemon juice may be used in obstinate hiccough, hepatic torpor and acute jaundice when the tongue is red and the urine alkaline. Under like conditions it is useful in acute articular rheumatism when the parts inflamed are deeply red and the general indications for acids are present. Lemon juice upon sugar will alleviate distressing cough, especially a persistent explosive cough, with spasmodic contraction of the throat upon lying down; when relief comes a slight translucent, jelly-like mass is expectorated. Lemonade is a delightfully refreshing refrigerant drink for fever patients when acids are indicated and bowel conditions will permit the use of large quantities of acidulated fluid. It also sometimes relieves sick headache, and a hot lemonade is a popular remedy to break up a "cold".

LINUM.

The ripe seeds of *Linum usitatissimum*, Linné (Nat. Ord. Linaceæ). Levant and southern Europe; cultivated.

Common Names: Flaxseed, Linseed.

Principal Constituents.—Mucilage, a fixed, viscid oil (*Oleum Lini*), proteids (25 per cent), and a minute trace of amygdalin.

Preparations.—1. *Oleum Lini*, Linseed Oil, (Oil of Flaxseed, Raw Linseed Oil). A yellowish oil of a bland taste and peculiar odor, gradually thickening and darkening in the air and acquiring a strong taste and odor. *Dose*, 1/2 to 1 fluidounce. Raw (not boiled) oil only should be used.

2. *Farina Lini*, Linseed Meal, (Flaxseed Meal). For poultices.

Action and Therapy.—*External.* Flaxseed and its oil are emollient. A flaxseed poultice (*Cataplasma Lini*) applied early upon inflamed and

painful surfaces will relieve pain, cause relaxation, and sometimes resolution. If applied after pus begins to form it will hasten suppuration. Deep-seated inflammation can often be aborted by the judicious use of a flaxseed poultice. The danger of favoring sepsis when used upon open or abraded tissues should be borne in mind. Equal parts of linseed oil and lime water form *Carron Oil*, the best primary dressing for burns and scalds (see *Aqua Calcis*). Linseed meal added to the wash water will assist in removing the odor of iodoform from the hands.

Internal. An infusion of the seeds (℥ss to Boiling Water, Oj) is an excellent demulcent forming a pleasant mucilaginous drink for inflamed or irritated membranes. It is especially useful in gastro-intestinal and renal inflammations, and as a lenitive after acute poisoning by irritants. The addition of licorice root or lemon juice and sugar makes of the foregoing an agreeable linctus for irritative coughs and acutely inflamed bronchial mucous membranes. Linseed oil is a good laxative and is sometimes used as an enema to remove ascarides. Hemorrhoids have been cured by the laxative influence of linseed oil given in daily repeated doses of 1 to 2 ounces. Linseed oil may be given freely in poisoning by alkalies, when other bland oils are not at hand.

LIQUIDAMBAR.

The balsamic exudate or concrete juice of *Liquidambar styraciflua*, Linné (Nat. Ord. Hamamelaceæ). The sweet-gum tree of the United States, Mexico, and Central America.

Common Name: Sweet Gum.

Description.—An opaque, almost black, soft, adhesive, resinous mass, or hard masses breaking with a resinous fracture, of the pleasant odor of benzoin, and a bitterish, pungent, benzoinic taste. It softens in warm weather; becomes hard in cold weather. Soluble in alcohol, ether, chloroform, and fats and oils. *Dose*, 1 to 15 grains.

Principal Constituents.—The resin *styrol*, *cinnamic acid*, *styracin*, and *storesin*, a complex alcohol.

Action and Therapy.—*External.* King highly valued an ointment of liquidambar and lard or tallow, equal parts, as a softening and antiseptic application to ulcers and in anal fistulæ with indurated edges, and especially for indolent ulcers and old sores upon the legs. Like many balsamic preparations it is said to benefit in parasitic skin diseases, as ringworm of the scalp and porrigo scutulata. It is also reputed to give relief in hemorrhoids. It should be tried in anal fissure, as it acts without causing pain. To render it more efficient, though probably at the risk of causing some pain, we would suggest the addition of a small amount of salicylic acid.

Internal. Like most balsams it is effectual in chronic coughs and catarrhs.

LIQUOR AMMONII ACETATIS.

Solution of Ammonium Acetate, Spirit of Mindererus.

Description.—A clear, mildly saline and acidulous liquid, without color, free from empyreuma, and acid in reaction. It should be *freshly prepared*. It should contain at least 7 per cent of ammonium acetate, with a small proportion of acetic and carbonic acids.

To prepare it: 5 parts of good, heavy, translucent lumps of ammonium carbonate are to be added to 100 parts of diluted acetic acid and stirred until dissolved. The dose is 1 to 6 fluidrachms. It is usually dispensed, for use with children, with an equal amount of simple syrup, and given in doses of 1 to 2 fluidrachms.

Specific Indications.—Impaired capillary circulation, with tardy eruption in the exanthemata; acute alcoholism; sick headache with depression.

Action and Therapy.—*External.* Applied upon compresses, solution of ammonium acetate sometimes gives relief in the early stage of mammitis, orchitis, epididymitis, mumps, and to resolve glandular engorgement.

Internal. This solution is refrigerant in small doses, and diaphoretic and diuretic in large doses, the latter properties being increased by its combination with spirit of nitrous ether. It is sometimes useful in fevers and inflammations, when temperature is not very high. Its chief value, however, is in the exanthems when the circulation is feeble and the eruption tardy, while in the declining stages, with depression of the nervous system, dry skin, and renal inactivity, it may be given in half-drachm doses to re-establish secretion. We value it greatly in measles for these purposes and to alleviate the dry cough and liquefy the bronchial secretions. It is a useful stimulant where alcohol cannot be tolerated, and when such stimulus is needed in the stage of depression in typhoid and other low fevers no safer agent can be used. It does not disturb the brain, but when operating kindly quiets delirium and permits sleep. In acute bronchitis and in broncho-pneumonia it ranks in efficiency with chloride of ammonium. In the initial stages of acute catarrh of the naso-bronchial tract and in influenza to control cough and favor expection, drachm doses may be given every two or three hours. It is a popular and quite certain medicine to quickly sober a drunken individual, and for this purpose excels the other ammonium compounds. Two or three drachms should be given in a large quantity of water. An agreeable form of administration is equal parts of solution of ammonium acetate and syrup.

LIQUOR FERRI ACIDI.

Acid Solution of Iron (Howe's), Acid Iron.

Description.—A clear, amber-colored solution, prepared by triturating in a mortar ferrous sulphate (2 parts) and adding water (10 parts) and nitric acid (1 part). It should not be heated. Owing to unexplainable changes which occur in its reactions, it is difficult to make successive batches of this solution having the same appearance and characteristics. It has a pleasantly acid, styptic and ferruginous taste. *Dose*, 2 to 5 drops.

Specific Indications.—Pale, wax-like skin, with cherry-red mucous membranes.

Action and Therapy.—There are many Eclectics, and we are among them, who still believe iron to be a useful hematinic. While iron has been needlessly and recklessly exploited and in many instances has thus been brought into discredit, yet there is no medicine capable of greater good if judiciously and specifically administered. Of all the preparations of iron—ferric and ferrous, scaled salts and so-called organic iron of more recent introduction—there is none, in our opinion, that meets the requirements for iron medication as fully as the acid solution of iron, devised and introduced by Howe.

Acid solution of iron fulfills the uses of an acid and of iron. We find it invaluable in the debility following the stress of the winter season where simple anemia is marked. Pale, sallow girls with cherry red but unhealthy-looking lips, are especially the types largely benefited. During erysipelas and for the debility following an attack we value it above all other agents.

When specifically indicated it proves a good hematinic and restorative in chlorosis, anemia, chlorotic anemia, general debility, phthisis, after exhaustive purulent discharges, and other wasting diseases, and in chronic catarrhal affections. It may be dispensed in bulk, with directions to give two drops in water every three or four hours. Those who prefer it sweetened may have it in syrup of orange so measured that a teaspoonful will carry two drops. A favorite prescription is: ℞ Acid Solution of Iron (Howe's), fl℥j; Syrup of Orange, fl℥iv. Mix. Sig.: One teaspoonful preferably before meals and at bedtime. (The syrup of orange we prefer is that made by adding a fluidrachm of a hydro-alcoholic tincture of orange oil prepared by macerating the freshly-peeled outer rind of the sweet orange in equal parts of alcohol and water. It does not acquire a turpentine-like taste when added to acid medicines as does the syrup prepared from commercial oils of orange.) We also find acid solution of iron to be a good adjuvant to nux vomica or strychnine and to quinine, which may be dissolved in it, and to Fowler's Solution, converting the arsenic into a soluble acid preparation.

LIQUOR FERRI CHLORIDI.

Solution of Ferric Chloride, Solution of Iron Perchloride.

Description.—A reddish-brown liquid of acid reaction, an acid, strongly styptic taste, and a faint odor of hydrochloric acid. *Dose*, 1 to 10 minims, well diluted.

Action and Therapy.—*External.* This is a powerful styptic for localized hemorrhages due to accident or to operations, though it is only used where no other means can be devised, as when pressure or ligature cannot be applied. A 3 to 5 per cent solution may be employed. It has been effectively used in uterine hemorrhage, but not always with safety. It should only be employed as a last resort. It is better adapted to bleeding after the removal of tonsils, though adrenalin and similar bodies have now largely displaced its use. It should be remembered, however, for such an emergency and where other hemostatics fail. Chloride of iron will remove dense, confluent granulations from the tympanum with less pain than is occasioned by silver nitrate. It may also be used diluted for diphtheria, rectal prolapse, sweating feet, chilblains, ivy poisoning, chancre, fetid and weeping ulcers, and gangrene.

Loeffler's Solution, used very extensively as an antiseptic application to the throat in diphtheria and other forms of infectious sore throat, is composed of Menthol (10 parts), Solution of Ferric Chloride (4 parts), Alcohol (60 parts), and Toluol, q. s., to make 100 parts. Apply it to the affected part with a cloth- or cotton-tipped probang, or by means of an atomizer, every three or four hours.

Internal. Solution of Chloride of Iron is seldom used internally, the tincture being preferred. However, in intractable colliquative and choleraic diarrhœa it is sometimes useful; and to control hematemesis. From 5 to 10 drops, very largely diluted, may be employed as needed. Its internal use is of little value in hemorrhages below the stomach, for it is largely combined with the albumen of the food, which destroys its hemostatic power. It has been used with asserted benefit in pharyngeal diphtheria, both as an internal and topical medicine.

LIQUOR FERRI ET AMMONII ACETATIS.

Solution of Iron and Ammonium Acetate, Basham's Mixture.

Description.—An aromatic, red-brown, sweetish-saline liquid, having a faint after-astringency. It is composed of Tincture of Chloride of Iron, Dilute Acetic Acid, Solution of Ammonium Acetate, Aromatic Elixir, Glycerin, and Water. Preferably Basham's Mixture should be freshly prepared when needed. *Dose*, 1 to 4 fluidrachms, well diluted with water.

Action and Therapy.—Diaphoretic and diuretic. A popular remedy for the anemia of both acute and chronic interstitial nephritis; some believe it most efficient in tubular nephritis.

LIQUOR FERRI SUBSULPHATIS.

Solution of Ferric Subsulphate, Monsel's Solution, Solution of Basic Ferric Sulphate.

Description.—A deep, reddish-brown, odorless or nearly odorless liquid, of acid reaction, and strongly acid and styptic taste. It mixes with water and alcohol without decomposing. *Dose*, 2 to 10 minims.

If this solution be evaporated near escaping steam a light yellow mass is left behind, which, when reduced to a powder, is known as Monsel's Salt. It is a styptic and is used for the same purposes for which the solution is employed.

Action and Therapy.—*External.* A powerful but almost unirritating coagulant of blood and albumen. It produces a voluminous clot, which continues to enlarge for hours after its application, and becomes hard and firm. It is employed chiefly upon superficial wounds, when it instantly stops bleeding, and in hemorrhages of the mouth, nose, and throat, and after operations upon these parts, where it is impossible to apply pressure or to ligate the vessels. Like all the iron styptics it produces unpleasant irritation of the nose when used in epistaxis. A better procedure, if possible, is to plug the nostrils with plain sterile gauze. Gangrene has followed the local application of iron subsulphate in rare instances. Like solution of perchloride of iron it has been used in alarming uterine hemorrhage, but is never a safe agent for that purpose.

Monsel's Salt is very deliquescent and may be used, like the solution, as a styptic.

Internal. Subsulphate of iron is seldom used internally. In 1 to 5 drop doses, well diluted, it may be given to check hematemesis.

LIQUOR FERRI TERSULPHATIS.

Solution of Ferric Sulphate, Solution of Tersulphate of Iron.

Description.—A nearly odorless, deep yellowish-brown fluid, acid in reaction, and having a sour and strongly styptic taste. It mixes with water and alcohol in all amounts without change. *Dose*, 3 to 10 drops.

This solution should be kept on hand for the preparation of the antidote to arsenic.

Action and Therapy.—*External.* A fairly unirritating styptic, when well diluted, which may be used to control bleeding from small surfaces. A pledget of cotton saturated with it may be pushed up in the nostril to the bleeding surface to stop epistaxis; or it may be used as a spray. Like all iron styptics it is less desirable than plugging the nose with gauze, because of the hardness of the clot formed, and subsequent irritation and danger of sepsis from decomposition of blood and mucus.

Internal. May be used in doses of 5 to 15 drops, well diluted, in hemorrhage from the stomach, and in the same dilution, by injection, for bleeding from the rectum.

LIQUOR FORMALDEHYDI.

Solution of Formaldehyde.

An aqueous fluid containing not less than 37 per cent, by weight, of CH_2O or $H.CHO$, with varying quantities of methyl alcohol to prevent chemical changes. It must be kept protected from light in a moderately warm situation.

Description.—A transparent, colorless or nearly so, irritating and irrespirable fluid, pungent to the nostrils and caustic to taste. It mixes with water and alcohol. Upon long standing in the cold it may become cloudy.

Action.—Formaldehyde destroys low forms of life, as bacteria and spores, probably by uniting with the amides of protein substances. Unfortunately it has no lethal action upon bedbugs, lice, roaches, and fleas, though it renders the atmosphere uncomfortable for mosquitoes, moths, and flies. It hardens histological specimens without destroying their cell formation or causing them to become brittle, or to refuse to take stains. Milk is preserved by very weak dilutions (1 to 32000), and slightly stronger solutions prevent the growth of the yeast plant. The urine passed by one who has taken minute quantities of formaldehyde or formaldehyde-liberating compounds will remain undecomposed for several days. Applied to the skin it causes no discomfort to speak of, but, like phenol, it leaves the surface roughish white, and after a while, insensitive. Its vapor, even in minute quantity, is extremely pungent, causing respiratory irritation, with pain, sneezing, and lacrimation. Its internal effects are not well established, except that it deodorizes the excretions and produces a sort of intoxication. Some believe it poisons the blood, disturbing the balance and chemistry of the red corpuscles. It is largely, if not wholly, excreted in the urine.

Uses as a Disinfectant.—Formaldehyde gas, on account of its antibacterial and germicide power, has been of late years the most extensively used house, furniture, garment, and fabric disinfectant. Its vapor is so diffusible that it reaches every crack and cranny, and may be used where mercuric chloride or phenol cannot be made to reach, and where sulphur and chlorine are destructive. While much investigation has been carried on to determine its penetrating properties, the conclusion has been reached that it is chiefly of value as a surface disinfectant. It is therefore to be used in vacated sick rooms, sleeping apartments, cellars, schools, libraries, etc., but probably is of little value for disinfecting the interior of books, dense piles of clothing and fabrics, etc. Formaldehyde gas disinfection has been practiced for the last fifteen or twenty years by Boards of Health, in houses, after infectious diseases, the vapor being applied through openings in doors while the cracks around doors and windows are sealed with gummed paper. A special vaporizer is used for the purpose. Now all druggists carry vaporizing lamps and candles of formaldehyde which may be used by the laity. Within the past two or three years there has been a revulsion in the practice of house disinfection, scientists having proved to their satisfaction that such a process fails to disinfect and adds greatly and unnecessarily to the public expense. Without doubt there is a middle ground; disinfection probably being best accomplished when a certain amount of moisture is also present.

Greatly exaggerated claims have been made in favor of the great disinfecting powers of formaldehyde upon pathogenic germs of death-

dealing diseases, which are not substantiated in actual practice. It is another instance of damning the reputation of a good agent by over-praise.

Excreta can be deodorized and disinfected by formaldehyde solution, and its use upon clothing worn by patients with the exanthemata and other infectious diseases is justified. It probably has no advantage here over milk of lime, or solution of chlorinated lime, except where the latter two may destroy color or fabric.

Therapy.—*External.* A 1 per cent solution of formaldehyde may be used as a surgical wash, and as a germicide, disinfectant, and deodorant. A slightly stronger solution has been advised as a vaginal wash for gonorrhœa in the female, and to be applied by swabbing, or upon tampons for fungous blenorrhagic endometritis. It is little used now, as formerly, to wash out the pelvic and abdominal cavities after operations, particularly for pus tubes. Its value as a deodorant for the fetid discharges of carcinomata is well established. Full strength formaldehyde may be painted upon bites of gnats, mosquitoes, and bedbugs. It has no special advantage here over less hardening applications. A wash is useful for fetid sweating of the feet and axillæ, or for sweating from any part of the body where it is desired to harden lax tissue. It should not, however, be carried out to the extent of "tanning the skin" over large surfaces, as has been advised. Ringworm is said to be destroyed by formaldehyde, though it has failed in our hands in deep forms of that affection. Psoriasis, lupus, and acne indurata are also said to be benefited by it. Its use as a lotion or vapor in respiratory infections and in ocular diseases has not found much favor among Eclectic practitioners, nor is it used by them internally.

LIQUOR MAGNESII CITRATIS.

Solution of Magnesium Citrate.

Description.—A colorless, pleasantly acidulous liquid without bitterness, and the agreeable flavor of carbonated lemonade. It should have no sediment. *Dose*, as laxative, 6 to 8 fluidrachms; as a cathartic, 6 to 12 fluidounces.

Action and Therapy.—Solution of citrate of magnesia should always be prepared fresh and is best given in broken doses of 4 to 6 fluidounces. It is an agreeable and popular laxative and can be taken by those who have a repugnance to Epsom salt. It is best given in repeated doses and may be used in subacute but not in actively inflammatory and febrile conditions, and for the relief of abdominal fullness, with flatus, and in sick headache due to gastro-intestinal indigestion.

LIQUOR SODÆ CHLORINATÆ.

Solution of Chlorinated Soda, Labarraque's Solution.

An aqueous solution of chlorine compounds of sodium, capable of yielding not less than 2.5 per cent of available chlorine.

Description.—A clear, pale greenish fluid, having a weak chlorine odor and an unpleasant alkaline taste. *Dose*, 1/2 to 1 fluidrachm, well diluted.

Action and Therapy.—*External.* One of the best agents to cleanse soiled garments and wash up the sick room. If left exposed to the air it gives off a small portion of chlorine gradually that penetrates every crack and crevice of the apartment. Diluted it forms a useful gargle for fetid sore throats, and a wash for foul ulcers, carcinomata, leucorrhœa, and in

unhealthy and slowly healing skin diseases. It is not so powerful as chlorinated lime for disinfection of excretions and bedding.

Internal. In large doses, Solution of Chlorinated Soda is an irritant poison; in small doses an efficient gastro-intestinal antiseptic in conditions of great prostration, with dry, brown-coated tongue and exhaustive and offensive discharges. It is particularly useful in the diarrhœa of typhoid fever, where sepsis is very marked. Remarkable improvement has resulted from its use, in small doses, well diluted. It also is useful in glandular enlargements, with foul conditions of the secretions of the body; it lessens temperature, clears up the foul tongue, and the patient arouses from the mental depression accompanying the profound prostration. A similar effect is produced in the diarrhœa of phthisis.

LITHII BENZOAS.

Lithium Benzoate.
(Formula: $LiC_7H_5O_2$.)

Description.—A permanent, light, white powder or small crystalline scales, without odor, or a faint benzoin fragrance, and a cooling, sweetish taste. It is very soluble in water and alcohol. *Dose*, 1 to 30 grains.

Specific Indications.—Fetid breath, bad taste, and imperfect nutrition, associated with persistent urinary irritation; lumbar uneasiness extending to the bladder, the urine voided bearing mucus and earthy phosphates, and the perineum feeling full and tense with frequent attempts at micturition, the urine being passed with difficulty; gout.

Action and Therapy. Like other benzoates this agent is valuable in chronic irritation and inflammation of the bladder with ammoniacal urine due or not to gravelly deposits. It is also believed to have some effect in preventing gouty paroxysms and has been accredited with preventing the formation of hepatic calculi. The latter has not been sufficiently proven. Its alkalizing and antiseptic effects are of considerable value and it favors elimination of viscous and unhealthful waste products.

LITHII BROMIDUM.

Lithium Bromide.
(Formula: LiBr.)

Description.—A very deliquescent, odorless, granular, white salt, with a sharp, bitterish taste. Very soluble in water, and freely in alcohol. *Dose*, 5 to 15 grains.

Specific Indications.—Flushed face; mental depression; insomnia due to mental and physical exhaustion; insomnia from cerebral congestion; severe interscapular pain; renal inactivity; mild epileptic seizure; tinnitus aurium, with temporal pain.

Action and Therapy.—This salt, of all the bromides, is the richest in bromine, carrying 92 per cent of that element, and next to the potassium salt is the most depressant of the group. As a hypnotic it excels all the bromides. Its lithontriptic properties are nil. While it has no depressing action upon the heart to speak of, it should not be used in anemic patients, in extreme debility, or where fatty or weak heart is evident. It is chiefly employed as a hypnotic in wakefulness from active cerebral circulation, and that due to worry and overwork, both physical and mental. Like hydrobromic acid it relieves tinnitus aurium and is effectual when that

symptom is associated with pain in the temporal region. In common with all the bromides it is used also for epileptic seizures, but is not equal to the potassium or sodium compounds for that purpose. To some extent it is used in chronic rheumatism and gout with urinary deposits, notwithstanding the small amount of lithium it contains.

LITHII CARBONAS.

Lithium Carbonate.
(Formula: Li_2CO_3).

Description.—A white, odorless, light powder, alkaline to the taste, and permanent in the air. More soluble in cold (78) than in hot water (140). *Dose*, 4 to 12 grains.

Specific Indications.—Indigestion and acid eructations, with urinary deposits; articular swellings with gouty deposits; gout.

Action and Therapy.—The physiological effects of lithium are believed to be intermediate between those of sodium and potassium, but in medicinal doses it produces no profound symptoms in man. Carbonate of lithium and the citrate, which is ultimately voided as carbonate, cause a marked increase in the flow of urine, which is rendered strongly alkaline. They are believed to increase nitrogenous elimination. The extravagant claim that lithium salts would dissolve uric acid in the system has not been sustained, no matter how successfully they act in the test tube; nor is the once-believed theory that they form biurates in the body fluids still maintained. Aside from these biochemical suppositions the clinical use of them continues with apparently good effects in tendency to form sandy and gravelly deposits and in gout and gouty arthritis, much of the good probably being due to the large amount of water taken with them, thus ridding the body of broken-down waste. They seem to have greater affinity for acid phosphate deposits than for uric acid. The good results of drinking lithia waters could possibly be obtained partially by the free use of plain water, and some of the results obtained at lithia springs resorts must be attributed to rest from care and worry and to changed environment. It sometimes relieves indigestion with acid eructations in patients who void sandy and gravelly urine. We have observed a whole family affected with diffused seborrhœa of the body from drinking commercial lithia water. The skin lesion promptly disappeared upon discontinuing the use of the water.

LITHII CITRAS.

Lithium Citrate.
(Formula: $Li_3C_6H_5O_7.4H_2O$.)

Description.—A white or granular powder, having a cooling, feebly alkaline taste, and no odor; deliquescent in moist air; very soluble in water (1.5) and slightly in alcohol. *Dose*, 1 to 10 grains.

Preparation.—*Lithii Citras Effervescens*, Effervescent Lithium Citrate. *Dose*, ʒss to ʒii.

Specific Indications.—Indigestion and acid eructations, with urinary deposits; articular gouty swellings; gout.

Action and Therapy.—More agreeable than carbonate of lithium and more readily soluble. Its use is the same as for that salt, as it is ultimately converted into the carbonate in the body. Large and continued doses are apt to produce cardialgic dyspepsia. The effervescent salt furnishes a pleasantly acidulous form of administration.

LITHII SALICYLAS.

Lithium Salicylate.
(Formula: $LiC_7H_5O_3$.)

Description.—An odorless, white or grayish-white powder, having a sweetish taste; deliquescent in moist air, and freely soluble in water and alcohol. *Dose*, 1 to 8 grains.

Specific Indications.—Rheumatic diathesis, with urinary deposits of sand and gravel.

Action and Therapy.—This salt contains more of the salicylic acid radical than sodium salicylate, but is regarded as less depressing. Full doses produce the characteristic salicylic tinnitus and impairment of hearing, dizziness, and headache, and a persistently painful and distressing diarrhœa has resulted from immoderate doses. Lithium salicylate is preferred by some physicians to the sodium compound in treating acute, subacute, and chronic articular rheumatism, acting best in the chronic varieties with associated gouty diathesis. It may also be exhibited, like the other lithium salts, in gout and phosphatic and uric acid gravel, if given largely diluted with water.

LOBELIA.

The leaves, tops, and seeds of *Lobelia inflata*, Linné (Nat. Ord. Lobeliaceæ). Abundant in the United States. *Dose*, 1 to 60 grains.

Common Names.—Lobelia, Indian Tobacco, Wild Tobacco, Puke Weed, Emetic Weed, Emetic Herb, Vomit Weed, etc.

Principal Constituents.—The unstable liquid alkaloid *lobeline*, combined with *lobelic acid;* fixed and volatile oil, and an unimportant nonbasic substance, *inflatin*. The so-called *lobelacrin* of Enders is probably lobeline lobeliate.

Preparations.—1. *Specific Medicine Lobelia*. *Dose*, 1/10 to 60 drops. (*Usual form of administration:* ℞ Specific Medicine Lobelia, gtt. v to xxx; Water, q. s. fʒiv. Mix. Sig.: One teaspoonful every 1 to 3 hours.)

2. *Subculoyd Lobelia*. *Dose*, 1 to 30 drops. Designed chiefly for hypodermatic use.

3. *Pulvis Lobeliæ Compositus*, Compound Powder of Lobelia (Emetic Powder). Contains Lobelia (6), bloodroot (3), skunk cabbage (3), ipecac (4), capsicum (1). *Dose*, as an emetic, 2 drachms in broken doses of 1/4 to 1/2 drachm, in warm water, every 15 minutes. Used chiefly locally.

4. *Tinctura Lobeliæ Composita*, Compound Tincture of Lobelia, (Acetous Emetic Tincture, Expectorant Tincture). *Dose*, fʒss to fʒiii.

5. *Libradol*. For external use.

Specific Indications.—Fullness of tissue, with full veins and full arterial flow; full labored and doughy pulse, the blood current moving with difficulty; short, labored breathing; sense of suffocation; dyspnœa with præcordial oppression; pain in chest of a heavy, sore, or oppressive character; pulmonary apoplexy (full dose); mucous accumulations in the bronchi; dry croupal cough, with scant or oversecretion; asthmatic seizures; short, lancinating pain radiating from heart to left shoulder and arm; spasmodic muscular contraction; muscular rigidity; infantile convulsions from irritation of the bowels, or from respiratory obstruction; hysterical convulsions; rigid os uteri with thick doughy and unyielding rim; perineal and vaginal rigidity during labor; angina pectoris (full doses).

Action.—Lobelia apparently acts upon the central nervous system, the myoneural junction of the muscles of volition, and the sympathetic nerve ganglia, and by some is classed with the nicotine group in pharmacological effects. It is a powerful gastro-intestinal irritant, producing emesis. Should it fail to vomit, which is rare, purgation may result. In large doses a state of near-collapse is induced. Small doses act upon the

cardiac inhibitory apparatus, slowing the heart action, but this is followed by a more or less accelerated pulse. During the depressive stage blood-pressure is lowered, but subsequently becomes increased. Small doses stimulate, and large doses paralyze the respiratory centers and the vagal terminals and ganglia in the bronchi and lungs, death, when it occurs (in animals), resulting from respiratory paralysis (asphyxia). Lobelia is most largely eliminated by the kidney, though some is thought to be excreted by the skin.

If lobelia be chewed it causes an acrid, prickling, and persistently pungent sensation in the throat and fauces, accompanied by slight nausea and a feeling of warmth and distention along the esophageal tract and in the stomach. The sensation is not very unlike that produced by tobacco. The salivary glands and those of the mouth are impressed, pouring out saliva and mucus in abundance. A sense of epigastric depression succeeds, followed by profound nausea, and if the amount chewed be large enough, severe and thorough emesis results. The gastric mucus is secreted in great abundance and ejected with the contents of the stomach. The emetic action of lobelia is extremely depressing, and is usually accompanied by profuse perspiration. Oppressive prostration, relaxation of the muscular system, and a languid pulse accompany the emetic stage. The depression, however, is of short duration, and is immediately followed by a sense of extreme satisfaction and repose. Under its action the mental powers are unusually acute, and the muscles are powerfully relaxed. The circulation is enfeebled by large and strengthened by small doses, and the bronchial secretions are augmented.

Lobelia, in the ordinary sense of the term, is not a lethal poison. Undoubtedly its injudicious use has and might produce death, but the same is true of many other drugs that are not ordinarily considered as poisons. That the alkaloid lobeline will kill animals has been fully demonstrated. A drop of the alkaloidal solution placed upon the tongue of a strong, healthy man instantly vomited him. To this property of its alkaloid is undoubtedly due the failure of lobelia to act upon man as a lethal agent. Its emetic action is so prompt and decided that the contained alkaloid does not, under ordinary circumstances, produce fatal results. Given in cases in extremis, the resulting exhaustion from repeated emesis would very likely hasten death, but death would be more likely due to the act of vomiting exhausting the patient than to any poisonous effect of the lobelia.

Therapy.—*External.* Infusion of lobelia, or the alcoholic preparations diluted and constantly applied by means of compresses, are among the most efficient applications in rhus poisoning. A lotion or a poultice (with flaxseed or elm) often relieves insect bites and stings, articular pain, the pain of bruises and sprains, and sometimes causes relaxation in strangulated hernia, and relieves the discomfort of erysipelatous inflammation. Powdered lobelia sprinkled upon a larded cloth and applied warm, or the compound emetic powder similarly used, is an invaluable local application to the chest in acute thoracic diseases, and gives marked relief from pleural and muscular pains and alleviates the sense of suffocation and fullness accompanied by a feeling of soreness within the chest. Libradol is a more

cleanly application and owing to the presence of glycerin is more or less dehydrating, thus making it a preferable application in swellings, bunions, and inflammatory affections of the joints. Libradol, or a lotion of equal parts of glycerin and the specific medicine, provides a grateful application to relieve pain and reduce tumefaction in orchitis and epididymitis; the lotion is the more easily applied.

Libradol is an exceedingly efficient local application in many disorders, to relieve pain and reduce local inflammations. It is not a cure-all, but covers two definite fields of action—the relief of disease conditions presenting:

(1) Pain and inflammation, with or without exudation, as occur in pneumonia, broncho-pneumonia, bronchitis, croup, pleurisy, acute pharyngitis, tonsillitis, orchitis, ovaritis, arthritis, synovitis, inflammatory rheumatism, boils, and bunions.

(2) Localized pain, along nerve courses, in joints, and in the muscular structures, as in some forms of rheumatism (subacute, non-inflammatory, articular, etc.), lumbago, facial, subscapular, and intercostal neuralgia, pleurodynia, and neuritis.

The specific indications for Libradol are: Pain with or without swelling or inflammation; inflammation with serous or mucous exudation; sharp, lancinating pain in the chest, aggravated by respiratory or other movements; congestion and engorgement of parts; dyspnœa; soreness in the pectoral region; dull, aching pain; subcutaneous and thecal inflammations; pain of syphilitic nodes and lymphatic swellings.

Pulvis Lobeliæ Compositus or *Compound Emetic Powder* is seldom used for the purpose indicated by its name—a purpose for which it was originally intended and which it admirably fulfills. It is for its effects when applied locally in broncho-pulmonic affections that it is so highly valued and that has caused it to outlive many other old Eclectic compounds. How it acts—how it can produce the results it does—remains yet a mystery and can not easily be explained scientifically, but that it does act, and very decidedly, is a well attested clinical fact, and its certainty makes it a remedy that we will not be likely to part with. It is the first application thought of by many when desiring an outward application in acute bronchitis, pleurisy, pneumonia, pleurodynia, and soreness of the pectoral walls. A well-larded cloth is sprinkled with the powder. This is then well warmed and applied directly to the chest. Goose fat probably is the best penetrating medium for its exhibition, and singularly recent scientific tests of the penetrability of fatty bodies has yielded the highest place to goose fat. Once more has science recognized the wisdom of the domestic medicationists, whose only claim to skill rested on their discriminatory clinical observation. The emetic powder may be freely used without danger of unpleasant consequences. It takes the place of the heavy poultices and thus gives little or no discomfort to the patient. If a cotton jacket (best prepared by lining an undershirt or waist with a uniform layer of cotton) be worn over the larded cloth the effects are all that can be desired from external applications. Petrolatum is substituted for other greases by some physicians.

Internal. From the early days of Eclecticism lobelia, through Thomsonian introduction, has been a valued medicine. Many properties were once ascribed it of which little note is now taken. Its chief uses, however, were as an emetic, expectorant, and antispasmodic, fulfilling all of these offices to the admiration of its prescribers. As an emetic it was regarded as not only prompt but efficient, but in order to render it safer and more efficacious, it was often combined with other substances, notably capsicum and ipecacuanha. Either as an expectorant or emetic, as the urgency of cases required, it was in free use in croup, whooping cough, asthma, dyspnœa simulating asthma, and pneumonia. In fevers it was used as a relaxant and to modify the circulation. When used as an expectorant it was usually combined with tincture of bloodroot, syrup of senega, wine of ipecac, or oxymel of squill. Doses of lobelia sufficient to excite nausea and relaxation were employed in epilepsy, chorea, cramps, hysteria, tetanus, strychnine poisoning, and other convulsive attacks. Internally, or by enema, it was largely employed to overcome rigidity of the uterus during labor, but its specific applicability, as now known, was not then differentiated. As a relaxant, when employed by rectal enema and in fomentations, it was highly regarded in treating strangulated hernia and other intestinal obstructions; and to release muscular contracture in tedious labors, and to facilitate the setting of fractures and reducing of dislocations. In extreme cases, oil of lobelia was employed and entered into liniments for severe neuralgic and rheumatic complaints. The infusion was used in ophthalmia; the tincture locally in sprains, bruises, rheumatic pains, erysipelatous and similar inflammations, eczema and other cutaneous diseases, and in poisoning by ivy. Poultices of lobelia were similarly employed. These were the days prior to the advent of specific medication through which a better understanding of the use of lobelia was acquired. Of these uses only the occasional employment still survives for the same purposes in croup, asthma, whooping cough, dyspnœa, children's convulsions, rigid os, and the local surface disorders named.

Lobelia is nauseant, emetic, expectorant, relaxant, antispasmodic, diaphoretic, sialagogue, sedative, and, secondarily, occasionally cathartic and diuretic and astringent. It is in no sense a narcotic. As an emetic lobelia is now seldom employed. In selected cases where a systemic emetic effect is desired it may still be employed with benefit. By a systemic emetic we mean one which, like lobelia, not only causes emesis, but reacts profoundly upon the nervous, circulatory, and secretory apparatus of the whole body, so that marked relaxation takes place and the stomach yields up a great quantity of thick, ropy mucus. Such an effect is sometimes desirable as a preparatory treatment for the better receptivity of medicines that would otherwise remain unabsorbed by the stomach, or when antiperiodics act indifferently or irritatingly unless a good cleaning of the stomach and relaxation of nervous tension are first insured. This is notably true of quinine, and often of the special or arterial sedatives. Though momentarily depressing, the reaction is decidedly beneficial, and it may well be used when depression is not too great to begin with, and the tongue is expressionless and foully coated at the base. In such instances we believe it should still be used in emetic doses in some chronic disorders of the stomach, and

especially in the incipient stage of intermittent and other allied fevers. We have seen it arouse from a general sluggish condition of atony those who have been ill for months and start them on the way to better health. When the emetic action of lobelia is desired, small doses of specific medicine lobelia, or of the powder in warm water, should be frequently administered until profound nausea is induced; then the medicine should be pushed rapidly to emesis. Large draughts of warm (not hot) water will hasten its action and render the act of vomiting easier. Lobelia should never be given to children or the old and feeble as an emetic; nor is it admissible in ordinary cases of poisoning, where depression may be increased by it. Such are to be treated with stimulating emetics.

The powerfully relaxant properties of lobelia make it an efficient drug where the spasmodic element is a factor. As of old, nauseant doses may be given to relax hysterical convulsions, worm convulsions, the convulsions of dentition, and other convulsive disorders of children. When mildly asthenic, lobelia may be used alone; when sthenic, bromide of potassium or gelsemium may be given with it. Usually, however, the indications are present for all three medicines. The best combination of drugs we have personal knowledge of for the relief of convulsions of childhood caused by errors of diet, such as the ingestion of half-comminuted bananas, nuts, or shredded cocoanut cakes, or of fresh flour dough, is the following: ℞ Specific Medicine Lobelia, Specific Medicine Gelsemium, aa fl℥j; Potassium Bromide, ℥j; Water, q. s. fl℥iv. Mix. Sig.: One teaspoonful every five minutes until complete relaxation is insured; then every two hours for a day. The warm bath and the enema should not be neglected. If convulsions are due to dentition or to the onset of infectious diseases, good will have been accomplished by placing the system in repose and giving a better receptibility for other medication. Lobelia is of little value in epileptic convulsions, and is rarely of service in tetanus. It has been used in strychnine poisoning, but is not to be commended, especially if given late, lest attempts at emesis provoke the already greatly excited reflexes and precipitate repeated paroxysms; and less than emetic doses would have absolutely no value. In puerperal eclampsia, in which it has also been advised, it is not to be compared with veratrum, gelsemium and chloroform in efficiency. When intestinal obstructions are due to a spasmodic state of the intestines it may be of service, as in intussusception and fecal impaction; and it may relax and relieve a strangulated hernia. Too much time must not be consumed in attempts at medication in these serious disorders, and an early resort to surgery is advisable. Spasmodic colic in both adults and children is sometimes quickly relieved by lobelia. In fact very small doses prove the very best treatment in colic of very young infants. For spasmodic croup and spasmodic asthma lobelia in nauseant doses is without a peer in drug therapeutics.

Lobelia is *the* drug for angina pectoris, neuralgia of the heart, and pulmonary apoplexy. Though evanescent in its action, large doses of specific medicine lobelia (about 20 drops) may be administered with the expectation of relieving the patient. The dose may be repeated as necessary. Lobelia is a cardiac stimulant, therefore we class it with the sedatives, for all arterial or special sedatives in medicinal (small) doses are heart

stimulants. When the circulation exhibits a markedly slow pulse-wave it will be better corrected by lobelia than by any other drug. In fact the most prominent indication for lobelia is the full, oppressed, sluggish, doughy pulse. Associate this with præcordial oppression, thoracic pain, difficult breathing, soreness or bruised feeling within the chest, nausea with tongue heavily coated at the base, fullness of tissue, and we have before us a fair range of the action of the drug. It is a good remedy in cardiac congestion.

Lobelia is of specific value in obstetrical practice. It powerfully subdues muscular rigidity. It is one of the remedies to overcome a rigid os during parturition, and at the same time it relaxes the perineal tissues, thus defending the parts against lacerations. This specific effect of lobelia has won many converts to specific medication. This it does when there is fullness of tissue—a thick, doughy, yet unyielding os uteri; when, however, the edge of the os is thin and closely drawn, sharp like a knife edge, full doses of gelsemium are indicated. For this antispasmodic action lobelia may be given in nauseant doses, preferably in hot water, by mouth and by rectum.

Lobelia is a stimulant to the sympathetic nervous system. It improves innervation of the parts supplied by both the pneumogastric and sympathetic nerves. The appetite and digestion are augmented by it and peristalsis of the whole gastro-intestinal tube greatly stimulated. All this it does best in small and repeated doses; and for these specific purposes it should be so employed and not for its nauseating and emetic effects, which it causes by pushing this stimulation to its limit. The conditions in which such violent and disturbing action is desired are sufficiently set forth above. Specific medication has proved that lobelia is indicated by the full, slow, labored, and doughy pulse, showing that the blood current moves with difficulty. Over the chest, and particularly in the præcordium there is a sense of oppression and weight and often a dull, heavy pain or soreness of an oppressive character and always associated with difficulty in breathing. Mucous rales in the bronchi are prominent and the cough is aggravating, but followed by free and full expectoration. The tongue is full, pallid, broad and flabby—expressionless, nausea is a common indication, and sick headache with nausea frequently encountered. The sympathetic and the vagus are always below par when lobelia is indicated. With any or several of these indications lobelia proves most valuable in the gastric and respiratory disorders named below. Even in this specific field comes partly its beneficent action in angina pectoris, though relaxation even to nausea apparently intensifies its ameliorating effects.

The small dose of lobelia is of distinct value in atonic types of indigestion and dyspepsia. In similar doses it may relieve sick headache due to gastric derangement, and is then indicated by a feeling of "qualmishness" and nausea. Though sometimes overlooked when we are seeking a drug to overcome intestinal atony, experience has proved lobelia, continued for some time in moderately small doses, to be one of the best agents at our command to gradually relieve habitual constipation. ℞ Specific Medicine Lobelia, gtt. j or ij, every 2 or 3 hours. This is accomplished by improving the innervation and peristalsis, and stimulating the secretions of the intestinal glands, as lobelia is in no sense a laxative in such doses. Admin-

istered with podophyllin and other cathartics it tends to prevent the after-constipative results that frequently follow the use of "bowel persuaders" when given in purgative amounts.

Lobelia is of value in common colds with a dry, irritative cough. It ranks with the best of antiasthmatics, and is equally serviceable in spasmodic asthma and in humid asthma, with scanty secretion in the first and over-secretion in the latter. In asthma, which is but a symptom of some grave body wrong, the urine should be examined for albumin, which, together with the asthmatic paroxysms, are sometimes the only early evidence pointing to nephritis. Nasal obstructions and deformities requiring removal by the nasal specialist should also be taken into account, as well as other causes for reflex excitation. With these absent lobelia is signally effective; it often fails in part or altogether when these abnormalities remain uncorrected. Lobelia is an equally certain remedy for the relief of spasmodic croup and the asthmatic form of acute laryngitis in children. In lobar pneumonia and in broncho-pneumonia it renders good service when there is much congestion and breathing is greatly oppressed. In chronic respiratory disorders it is valuable either to increase or decrease secretion, accordingly as the fuller or lesser doses are used, and to relieve cough. For coughs, when dry, barking, or hacking, or when loud mucous rales are heard, but there is difficulty in raising the sputum, lobelia may be employed alone, or in mixtures or syrups as indicated. For chronic coughs requiring lobelia a good form is the compound liniment of stillingia (which see), which contains the so-called oil of lobelia. For the cough of measles, when a sluggish circulation and imperfect eruption are factors, it proves useful in quieting the laryngeal irritation, controlling the catarrhal features, and more perfectly bringing out a tardy efflorescence. In both scarlet fever and measles, lobelia, by causing determination of blood to the skin, promotes the eruption when tardy and re-establishes it when retrocession occurs. It modifies many cases of whooping cough where abundant secretions of a stringy character almost strangle the sufferer. In short lobelia is a most admirable respiratory stimulant when the mucous membranes are dry, or when relaxed and secretion is free but difficult of expectoration. It should not be forgotten as one of the most valuable medicines in all stages of la grippe and epidemic influenza, as a vital stimulant, to regulate an imperfect circulation, and to control cough and expectoration. It is an admirable drug in post-grippal catarrhs, following the specific indications as given. Lobelia is seldom indicated, nor is it well borne, in advanced pulmonary tuberculosis.

It has been assumed by some that lobelia possesses the properties of an antitoxin in the sense that that term is now employed in biologic medication. This assumption we believe to be unwarranted without definite and exact biological experimentation. Such unsupported vagaries bring into discredit otherwise good and efficient drugs. That quite remarkable results have been obtained from its use in grave blood-disorganizing and specific diseases seem probable. But lobelia is essentially a vital stimulant, and this property, more than an antitoxic action as now understood, better explains its beneficent effect in diphtheria and other depressing septicæmic diseases.

Hypodermatic Use. For the so-called antitoxic and other general action, lobelia, hypodermatically administered, has come into prominent use in late years in many of the disorders for which the drug is given internally. In this manner the probability of nausea and vomiting is lessened, while its relaxant properties seem not to be diminished. In spasmodic asthma it sometimes gives prompt relief, and we have observed its effects most beneficially in gall-stone colic of a continuously nagging, though not very severe, type. We have also observed a remarkable increase of urine from the drug used in this way. To catalogue the conditions in which many have obtained asserted good effects would be to restate all the uses of lobelia given in this article, except that of emesis.

The subject of hypodermatic medication, involving a large number of vegetable medicines, has been purposely omitted from this work. The author is unalterably opposed to this too general practice because of the dangerous reactions that occur often enough to make one cautious. Thoughtless, and often unscrupulous, commercialism in medicine on the part of a few has brought about a demand from physicians for these hypodermatic forms of medicines, and to meet this demand reputable manufacturers of drugs have unwillingly yielded and have supplied a score or more of such preparations. Realizing that such preparations under the best of pharmacal care are liable to deleterious change or disintegration, or to the development of toxic material, the thoughtful manufacturer is unwilling to continue the supply of such drugs. Certain vegetable proteins may, and often do, become as obnoxious and dangerous as some animal proteins, and may produce allergic, or anaphylactic effects, as well as direct poisoning; and occasionally the most unhappy and near fatal consequences have resulted. Apparently lobelia and ergot are the safest of these preparations and they should not be recklessly or unnecessarily used, when other methods of medication may be just as effectually employed.

Acetous Emetic Tincture. Like the Compound Emetic Powder, this agent is now seldom employed as an emetic. On the contrary its reputation rests on its value as a remedy in coughs, colds, and broncho-pulmonic complaints. It is of service when the indications are present for both lobelia and sanguinaria. These drugs are more effective when tinctured with a certain proportion of vinegar, hence the superiority of this compound over the plain tinctures. Emetic tincture added to syrup will often render good service when a cough mixture for irritative cough, with deficient secretion, is desired. The dose of the tincture is from 20 to 60 drops.

RELATED MEDICINE.

Tobacco (*Nicotiana Tabacum*, Linné) and *Nicotine.* Tobacco was once used to a considerable extent upon painful inflammatory swellings and to relax strangulated hernia. It is seldom employed as a drug at the present day. When unaccustomed to its use in chewing and smoking it acts profoundly, causing vomiting and great depression; toleration is soon established. Nicotine is of toxicological interest chiefly, but rarely it is used to subdue pain. A solution of the combined alkaloids of tobacco, containing 1 per cent of nicotine, is on the market as *Dynamyne*, a preparation devised by Lloyd and Howe. It is a green-colored hydro-alcoholic liquid designed for external use only, a solution of 1 to 4 fluidrachms in a pint of water being applied by means of a compress upon localized inflammations, and to relieve the pains of neuralgia, pleurodynia, rheumatism, felons, abscesses, etc. Some persons are very susceptible to nicotine, hence this preparation must be used with great caution, and care should be had in handling or inhaling it. A combination of tobacco alkaloids is an ingredient of Libradol.

LUPULINUM.

Lupulin.

The glandular powder separated from the strobiles of *Humulus Lupulus*, Linné (Nat. Ord. Urticaceæ), the common Hop. (See *Humulus*.)

Description.—Brownish-yellow (becoming yellowish-brown), resinous granules, having the aromatic odor and bitter taste of hops. It is readily inflammable, and deteriorates upon long keeping. *Dose*, 5 to 20 grains in capsule or pill.

Preparation.—*Specific Medicine Lupulin. Dose*, 5 to 30 drops.

Specific Indications.—Nervousness, irritability, disposition to brood over trouble, delirium, insomnia, cerebral hyperæmia; genital and mental irritability associated with spermatorrhœa; fermentative dyspepsia, with acid eructations.

Action and Therapy.—Lupulin is administered in disorders for which infusion and tincture of hops were formerly given. It is a remedy for nervousness, to allay irritation and to produce sleep. It gives a sense of mental tranquillity which makes it a valuable agent in nervous unrest due to nocturnal seminal emissions, and relieves irritation of the genital tract when associated with the latter. It relieves irritation of the bladder, with frequent urination, and is quite efficient in chordee. When delirium tremens is accompanied by cerebral hyperæmia it is of considerable service. Insomnia due to nervous debility or to worry, or headache associated with active cerebral circulation, is benefited by lupulin; while for painful conditions it may be employed when they depend upon nervous debility. For the latter reason it has been given with success in dysmenorrhœa, and other painful conditions of the uterus and in after-pains. Lupulin checks fermentative changes in the stomach, thus proving useful in yeasty indigestion with acid eructations and dilation of the stomach, and in the headache due to such gastric disturbance.

LYCOPODIUM.

The spores of *Lycopodium clavatum*, Linné (Nat. Ord. Lycopodiaceæ) or Club Moss, a creeping perennial found in most parts of the earth; gathered mostly in Germany, Russia, and Switzerland.

Description.—An odorless and tasteless, very mobile, light-yellow powder, impervious to but floating on cold water, sinking when boiled with water, and burning with a sudden flash when in contact with flame.

Principal Constituents.—Nearly 50 per cent of greenish-yellow fixed oil; sugar, 2 to 3 per cent, and a trace of *monomethylamine* (CH_3NH_2).

Preparation.—*Specific Medicine Lycopodium. Dose*, 1/10 to 30 drops.

Specific Indications.—Extreme sensitiveness to the touch; urine deposits red sandy or phosphatic particles and readily stains the clothing; water-brash; borborygmus.

Action and Therapy.—*External.* Lycopodium forms a good protective and absorbent dusting powder for irritated and inflamed surfaces, for which purpose it is largely used in excoriations, intertrigo, herpes, erysipelas, dermatitis, eczema, ulcers, etc. Possessing moisture-repellant qualities it is used in preparing pills of hygroscopic chemicals, to facilitate the manipulation of pill masses, and to keep pills from adhering to each other. It is also employed as the pulverulent base of many insufflations.

Internal. According to Scudder, lycopodium is adapted to disorders showing "extreme sensitiveness of the surface; sensitiveness of a part and care to prevent it being touched; slow, painful boils; nodes or swellings;

external sensitiveness of the organs of special sense, with pale, livid, or dirty complexion."

Lycopodium is of much value in obscure forms of malarial fever, with afternoon exacerbations, and deep-red, scanty urine, which readily stains the garments. The fever is not active, but very depressing and intractable, and may be accompanied by sore throat, colic, diarrhœa, dysentery, or constipation. Used according to the specific indications, it is a useful gastric sedative, when in addition there is a sense of fullness and tenderness of the stomach. It often proves effective in pyrosis and fermentative indigestion, with borborygmus.

Lycopodium frequently relieves renal disorders with blood in the urine, and is of service in catarrh of the bladder in adults with painful micturition and gritty concretions. It should be given a fair trial in the lithic acid diathesis, when the passage of urine is attended by pain and red, sand-like particles are voided. The small dose, from the fraction of a drop to five drops of the specific medicine, is the most advantageous form of administration.

LYCOPUS.

The whole herb *Lycopus virginicus*, Linné (Nat. Ord. Labiatæ). Common in shady, moist and boggy places throughout the United States. *Dose*, 1 to 60 grains.

Common Names: Bugle Weed, Sweet Bugle, Paul's Betony.

Principal Constituents.—Tannic and gallic acids, a crystallizable glucoside, resin, and a volatile oil.

Preparation.—*Specific Medicine Lycopus. Dose*, 1 to 60 drops.

Specific Indications.—Vascular excitement, with rapid, tumultuous action of the heart, but lacking power; hemorrhage, passive and in small quantities, resulting from determination of blood to the lungs, kidneys, or gastro-intestinal canal; chronic debilitating cough, with weak and rapid heart action and expectoration of mucus or muco-pus; morbid vigilance and wakefulness, with inordinately active but weak circulation; albuminuria with the above characteristic circulatory disturbances; polyuria and some cases of diabetes with rapid heart action.

Therapy.—Lycopus is sedative, subastringent, and tonic. No other drug exactly duplicates its value in circulatory disturbances. Apparently its force is chiefly expended on the vascular structures and the sympathetic nervous system. Its sedative action is most certain when the circulation is excited—even tumultuous—with lessened cardiac power. This evident want of heart-energy, with quickened velocity, is the most direct indication for lycopus. For this purpose especially it is greatly valued in the advanced stages of acute diseases with great debility, and in chronic diseases with frequent pulse. Its action upon the stomach is kindly, and being a mild gastric tonic the appetite is sharpened and digestion facilitated. Normal secretion is favored by it, and blood-making and nutrition improved. Upon the cardio-vascular system it has been compared in action to digitalis, though it is far less powerful than that drug, and besides is non-poisonous and not cumulative. The influence of lycopus extends to all parts under control of the vegetative chain of nerves.

Lycopus is preëminently useful in passive hemorrhage, when the bleeding is frequent and small in amount. Thus it has acted well in epistaxis, hematemesis, hematuria, metrorrhagia, and intestinal bleeding. Its greatest

utility, however, is in passive pulmonary hemorrhage (hemoptysis). It probably acts by controlling the rapidity of the blood-current. In the first-named hemorrhages it may also act upon the unstriped muscular fibers, but in the pulmonary form these smooth fibers are largely absent in the small vascular terminals where the bleeding is most likely to occur. Therefore the control over the velocity of the circulation, and not its vaso-motor effects, seems the most rational explanation of its control in bleeding from the lungs. Whatever the cause of its action, it is nevertheless most decidedly effective.

Lycopus, by lessening irritation, allaying nervous excitement, and slowing and strengthening the heart, and consequently reducing fever and pain, is often successfully used in acute pulmonic complaints. It is more valuable, however, in chronic lung affections, to fulfill the same purposes, besides controlling or tending to prevent hemorrhage. In chronic bronchitis, with copious expectoration, and in chronic interstitial pneumonia, it has rendered good service. While by no means to be rated as an antitubercular agent, its cardio-vascular control and antihemorrhagic power make it an agent of unrivaled worth in those who show every evidence of tending toward a phthisical end, and we believe it will do as much as a medicine can do to stay the distressing ravages of pulmonary tuberculosis. When established it aids in relieving cough, pain, fever and the rapid and excited heart action. In pulmonary hemorrhage we have frequently used with it specific medicines ipecac and cinnamon with the happiest of results. The chief guides to its selection in respiratory therapeutics are the hemorrhage and circulatory excitability.

In heart disorders, both functional and organic, lycopus should not be disregarded. It may be used where digitalis cannot be employed on account of its offensive action upon the stomach. Administered to patients suffering from endocarditis and pericarditis it has sometimes subdued the inflammation. It is a good remedy in cardiac palpitation, dependent upon irritation of the cardiac nerve centers, or when arising from organic lesions. It is best adapted to those forms of heart disease characterized by irritability, irregularity, and weakness, with dyspnœa and præcordial oppression. Lycopus powerfully increases the contraction of the non-striated muscular fibers, particularly those of the heart and arteries, hence its value in cardiac dilatation and hypertrophy—conditions which have been known to undergo marked improvement under its administration. It quickly relieves the suffering and anxiety nearly always experienced in heart diseases; and is of especial value to relieve the rapid heart action of excessive smokers.

Lycopus is a remedy for morbid vigilance and insomnia attendant upon either acute or chronic diseases; and is especially serviceable when sleep is prevented by the exaggerated force of the heart. It has been ill-advised, and is largely over-rated, for the cure of diabetes and the relief of chronic nephritis. The most it can do in these conditions is to allay unpleasant heart symptoms and quiet nervous unrest. It has favorably influenced the circulatory aberrations in exophthalmic goitre, but far more often it has failed. Painful and distressing forms of indigestion are sometimes relieved by it, and it has been employed with advantage in simple diarrhœa (lientery), dysenteric diarrhœa, and especially in the diarrhœa of phthisis, and the gastric disturbances of the drunkard.

MACROTYS.

The rhizome and rootlets of *Cimicifuga racemosa* (Linné), Nuttall (Nat. Ord. Ranunculaceæ). A conspicuously handsome perennial widely found in rich woodlands of the eastern half of the United States. *Dose*, 1 to 20 grains.

Common Names: Black Snakeroot, Black Cohosh, Rattleweed.

Principal Constituents.—No alkaloidal principles have been isolated from the drug, but it yields a mixture of resins upon which, according to some, the virtues of the plant depend. An impure mixture of the resins is variously known as cimicifugin, macrotin, or macrotyn, and was one of the early Eclectic resinoids. Though not without value, the latter is now scarcely ever employed.

Preparation.—*Specific Medicine Macrotys. Dose*, 1/10 drop to 20 drops.

Specific Indications.—Heavy, tensive, aching pain (Scudder); pain characterized as rheumatic—dull, tensive, intermittent, drawing, and seeming as if dependent upon a contracted state of the muscular fibers; soreness of muscular tissues, as if one had been pounded or bruised; the so-called rheumatoid pain; stiff neck; aching of whole body from colds, the onset of fevers, or from muscular exertion; lumbago; bruised feeling of muscles of the forehead, with stiffness of the ocular muscles; soreness and stiffness of the throat with sense of muscular drawing in the pharynx and fauces; muscular pains in the loins, thigh, or back, of a drawing character; deep-seated boring and tensive pains; rheumatoid dyspepsia, associated with rheumatism of other parts, and in those having a rheumatic diathesis who experience dull, aching pain and tenderness in stomach and bowels, with tendency to metastasis, and aggravated by food and drink, the stomach feeling as if painfully contracting upon a hard body or lump; the soreness and aching intestinal pains of abdominal grip, when of rheumatoid type; sore, bruised sensation in the respiratory tract; chronic muscular rheumatism; ovarian pains of a dull aching character; dragging pains in the womb, with sense of soreness; the dull tensive pains incident to reproductive disorders of the female, as well as the annoying pains accompanying pregnancy; false pains; after-pains; weak, irregular uterine contractions during labor; irregular, scanty, or delayed menstruation, with dull pain and muscular soreness; chorea, with absentio mensium; and rheumatism of the uterus.

Action.—Upon man moderate doses of cimicifuga give slowly increased power to the heart and a rise in arterial pressure. Large doses impress the cerebrum decidedly, and probably other parts of the nervous system not yet definitely determined—occasioning vertigo, impaired vision, pupillary dilatation, nausea, and vomiting of a mild character, and a reduction in the rate and force of the circulation. A condition closely resembling delirium tremens is said to have been produced by it. Full doses cause a severe frontal headache, with a dull, full or bursting feeling. This headache is the most characteristic effect observed when giving even therapeutic doses. While large amounts may poison, no deaths have been known to occur from its use. The physiological action has been well determined upon animals, but it gives no hint as to the possible relationship of the drug to its practical therapy and clinical worth, admitted as valuable by practitioners of all schools of medicine.

In small doses cimicifuga increases the appetite and promotes digestion. Larger amounts augment the gastro-intestinal secretions. It is excreted

by both the skin and kidneys, imparting to the urine the peculiarly earthy odor of the drug. It also stimulates the bronchial secretion, making it a serviceable though not pronounced expectorant. That it acts upon the uterine, and possibly other smooth muscular fibers of the tubular organs or the nerves supplying them, is evident from its known power of increasing and normalizing weak and erratic contractions during labor. It also stimulates the function of menstruation and is said to increase the venereal propensity in man.

Therapy.—Macrotys is primarily a remedy for rheumatoid and myalgic pain and in disorders of the reproductive organs of women. It apparently possesses sedative, cardiac, anodyne and antispasmodic properties, and is an ideal utero-ovarian tonic. Macrotys was introduced into Eclectic medicine by King in 1844 as a remedy for acute rheumatism and neuralgia with such success that it gradually came to be recognized as a leading medicine for these disorders. The extensive list of indications given on page 466 shows sufficiently its general scope of application. While many still regard it as one of the first of antirheumatics, others, and we are among the number, regard it as less fully an antirheumatic than as an anodyne for pain simulating rheumatism, or the so-called "rheumatoid pain". The original indication as enunciated by Scudder is "heavy, tensive, aching pain". This is essentially different from the exquisitely sensitive and acute pain of acute articular rheumatism. It is not to be understood that it is of no value in this affection, but that it is of greater worth as an associate remedy. It assists in relieving the pain, but rheumatism is, without doubt, an infectious disorder and needs something more directly antagonistic to the infecting agent, and the salicylates prove better than any others for this purpose. As a matter of fact, the indications for both macrotys and sodium salicylate are usually present. As they do not interfere with each other, they may be judiciously given together, and administered in this manner aid the action of each other so that lesser doses of the salicylates are required. ℞ Sodium Salicylate, ʒij; Asepsin, gr. x; Specific Medicine Macrotys, fl ʒi to ij; Fluidextract of Licorice, fl ʒii; Water, q. s., fl ʒiv. Mix. Sig.: One teaspoonful every two or three hours as seems to be demanded.

When pain persists in spite of this medication, and fever is active, aconite, veratrum or gelsemium, particularly the first named, produces a marked change in the activity of the disease. Fever subsides, secretion becomes reëstablished, pain is markedly decreased, and sleep, that has been impossible, is permitted. That it protects the heart and strengthens it during rheumatic invasions seems established. In so-called rheumatism of the heart and rheumatic endocarditis it may be given with expectation of relief, and in diaphragmatic rheumatism, pleurodynia, intercostal and other neuralgias its pain-relieving effects are apparent. Gastralgia, enteralgia, mediastinal pain, tenesmic vesical discomfort, pain in the orbits and ears, when acute and rheumatoid in character, derive quick relief from macrotys. When diseases of the ear are associated with rheumatism, macrotys aids in giving relief, as it does in neuralgia in the same area when accompanied by stiffness of the faucial and pharyngeal muscles. It is the remedy in acute muscular pain, such as occurs in the myalgias of the chilly

seasons of the year, in torticollis, and in the pains, tensive and contractive, due to changes of weather and muscular exertion. Here macrotys is often the only agent needed. If febrile reaction occurs, either aconite or veratrum, as indicated, or possibly gelsemium, may be alternated with it.

According to Webster cimicifuga is a remedy for dyspeptic manifestations when due to rheumatoid states of the gastro-intestinal canal, or when associated with rheumatism of other parts of the body. It should be remembered in those cases where there is a dull or aching pain and tendency to metastasis, made worse by taking food or drink, and when the walls of the stomach seem to be contracting upon a hard lump, the patient having a rheumatic tendency or history.

In the acute infectious and non-infectious diseases it is a most important drug to relieve the muscular discomfort. Macrotys and eupatorium in liberal doses are the best remedies for the intense muscular aching and bone-breaking pains experienced at the onset of the rheumatoid type of influenza, and in other forms of la grippe. In the respiratory forms they also relieve cough and bronchial soreness. The amelioration of pain is prompt and enduring, and unlike aspirin and the coal-tar products, the drug is absolutely without danger to the heart or nervous system. Should a sense of fullness in the frontal region or a bursting headache be occasioned by full doses, it quickly subsides, with no after-effects, upon withdrawal of the drug.

For headache, whether congestive or from cold, neuralgia, dysmenorrhœa, or from la grippe, macrotys is often promptly curative. In eye strain from over-use of the eyes, giving rise to headache, and associated with a sensation of stiffness in the ocular muscles, or a bruised feeling in the muscles of the frontal region, macrotys is one of the most successful of remedies. As a palliative agent in phthisis pulmonalis, good results are obtained, in that it lessens cough, soothes the pain, especially the "aching" under the scapulæ, lessens secretions and allays nervous irritability. In the cerebral complications of the simple and eruptive fevers, especially in children, its action is prompt and decisive. It uniformly lessens the force and frequency of the pulse, soothes pain, allays irritability, and lessens the disposition to cerebral irritation and congestion. In febrile diseases especially, it induces diaphoresis and diuresis. In the exanthemata it is a valuable agent, controlling pain, especially, it is asserted, the terrible "bone aches" of smallpox, rendering the disease much milder. In scarlatina and measles it relieves the headache and the backache preceding the eruptions.

Macrotys is a very important drug in the therapeutics of gynæcology. It is a remedy for atony of the reproductive tract. In the painful conditions incident to imperfect menstruation its remedial action is most fully displayed. By its special affinity for the female productive organs, it restores suppressed menses. It is even a better remedy in that variety of amenorrhœa termed "absentio mensium". In dysmenorrhœa it is surpassed by no other drug, being of greatest utility in irritative and congestive conditions of the uterus and appendages, characterized by tensive, dragging pains, resembling the pains of rheumatism. If the patient be despondent and chilly, combine macrotys with pulsatilla, especially in anemic subjects. In the opposite condition associate it with gelsemium. It is a good remedy for

the reflex "side-aches" of the unmarried woman; also for mastitis and mastodynia. Macrotys relieves soreness and tenderness of the womb when aggravated by walking or jarring of the organ when descending steps; and through its tonic power helps to reduce uterine subinvolution. It should be remembered in so-called rheumatism of the uterus, and in uterine leucorrhœa, with a flabby condition of the viscus. When there is a disordered action or lack of functional power in the uterus, giving rise to sterility, cimicifuga has been known to do good. Reflex mammary pains during gestation are relieved by it, and in rheumatic subjects it promptly relieves ovaralgia and ovarian neuralgia, the pain being of an aching character. For the latter condition it is one of the best remedies known.

Orchialgia and aching sensations of the prostate are conditions sometimes relieved by macrotys, and as a tonic and nerve sedative it is not without good effects in spermatorrhœa. Its effects are less apparent upon the male reproductive organs, however, than those of the female.

Macrotys has proved a better agent in obstetrical practice than ergot except for the control of hemorrhage. It produces natural intermittent uterine contractions, whereas ergot produces constant contractions, thereby endangering the life of the child, or threatening rupture of the uterus. Where the pains are inefficient, feeble, or irregular, macrotys will stimulate to normal action. For this purpose full doses should be given in hot water; many still prefer a decoction of the root for this purpose. Unfortunately it is less employed than formerly since pituitrin has come into use. Its simulation of normal parturient efforts, however, makes it still the ideal regulator of uterine contractions during labor. It is an excellent "partus præparator" if given for several weeks before confinement. It is a diagnostic agent to differentiate between spurious and true labor pains, the latter being increased, while the former are dissipated under its use. It is the best and safest agent known for the relief of after-pains, and is effectual in allaying the general excitement of the nervous system after labor.

Macrotys has a powerful influence over the nervous system, and has long been favorably known and accepted as the best single remedy for chorea. It may be used alone or with valerian, equal parts. More especially is it useful when the incoördination is associated with amenorrhœa, or when the menstrual function fails to act for the first time. Its action is slow, but its effects are permanent. It has been used successfully as an antispasmodic in hysteria, and as an aid to treatment in epilepsy when due to menstrual failures: and in spasmodic asthma and kindred affections, nervous excitability, and pertussis. In the latter it sometimes proves better than any other drug, and especially if the child is one subject to periodic choreic seizures. As the heart is never injured, but on the contrary is strengthened and toned by macrotys, the drug is very valuable as an auxiliary to other agents in nervous affections, particularly when the latter depend upon, or are associated with chorea.

The usual form of administration is: ℞ Specific Medicine Macrotys, gtt. x to xxx; Water, q. s., fℨiv. Mix. Sig.: One teaspoonful every two hours. In most instances the fuller doses, short of producing headache, are the most effective, and the maximum amount given in this prescription may be considerably increased (fℨj or fℨij) for adults.

MAGNESII CARBONAS.

Magnesium Carbonate.

A mixture of hydrated magnesium carbonate and magnesium hydroxide which, according to the U. S. P., should correspond to not less than 39.2 per cent of magnesium oxide nor contain more than 0.8 per cent of calcium oxide.

Description.—Permanent, white, easily broken masses, or a white bulky powder, odorless and with a feebly earthy taste. Almost insoluble in water and alcohol. *Dose*, ʒj to ʒii.

Preparation.—*Magma Magnesiæ*, Magnesia Magma (Milk of Magnesia). A thick, white liquid containing magnesium hydroxide suspended in water. It is prepared by the interaction of magnesium carbonate, sodium hydroxide, and water. *Dose*, fl ʒj to fl ʒiv.

Action and Therapy.—Magnesium carbonate is antacid and purgative if in contact with an acid in the gastro-intestinal canal. If no acid is present it does not purge. This may be conveniently supplied by adding it to lemonade and drinking it while it is effervescing. As an antacid it is effectual but not so useful for infants as the oxide, on account of the liberation of carbon dioxide, which, though in itself somewhat quieting to pain, is overbalanced in this direction by the painful distention it may cause. It is to be used for acid conditions of the stomach, with constipation and sick headache, and (chiefly in mineral waters) in the uric acid diathesis. It is sometimes useful in acid diarrhœa, and long administered is said to remove cutaneous hypertrophies, such as warts.

Milk of Magnesia (Magma Magnesiæ) is a favorite laxative for infants and children, especially the bottle fed, and for alkalinizing the blood in renal and nutritional disorders to prevent or overcome acidosis.

MAGNESII OXIDUM.

Magnesium Oxide, Magnesia, Light Magnesia, Calcined Magnesia. (Formula: MgO.)

Description.—A bulky, very fine, white, odorless powder, having an earthy taste; water scarcely dissolves it. On exposure it slowly absorbs moisture and carbon dioxide. *Dose*, 10 to 60 grains.

Action and Therapy.—*External.* Used chiefly as an absorbent dusting powder.

Internal. Light magnesia is an ingredient of the *Arsenic Antidote* (*Ferri Hydroxidum cum Magnesii Oxido*), which see. Though possessing the properties of heavy magnesium oxide, it is less employed internally on account of its bulkiness. Its uses are the same as for *Magnesii Oxidum Ponderosam*, which see. *Dose*, as a laxative, 30 to 60 grains; children, 5 to 10 grains; as an antacid, 10 to 30 grains.

MAGNESII OXIDUM PONDEROSAM.

Heavy Magnesium Oxide, Heavy Magnesia. (Formula: MgO.)

Description.—A very fine, dense, white powder, without odor and of an earthy taste, but does not readily unite with water to form a gelatinous hydroxide (difference from light magnesia).

Specific Indications.—Gastro-intestinal acidity, pyrosis, heart burn; excoriating feces; constipation with acidity.

Action and Therapy.—Heavy magnesium oxide is antacid and laxative, producing feculent and somewhat deodorized stools, If there is an excess of acid present in the stomach the passages are thinner. As a laxative it is slow (5 or 6 hours) but mild and thorough, and seldom causes any griping.

It requires the presence of an acid to make it act efficiently, therefore it is to be selected when both an antacid and laxative are required as in acidity of the stomach and constipation, with or without headache. It is valuable in pyrosis, and the gastric acidity sometimes accompanying pregnancy. If given too freely or too long it may form concretions in the stomach and bowels. This may be obviated by an occasional dose of lemon juice or of lemonade. It is a splendid laxative and agent to offset hyperacidity accompanying gastric ulcer. Sick headache, with sour stomach, and the nausea and vomiting of pregnancy are often cut short by a few doses of magnesia oxide. In atonic dyspepsia with acidity and constipation, from 5 to 10 grains of rhubarb, 2 grains of ginger, and 20 to 40 grains of magnesia are effective in overcoming the constipation and correcting the hyper-acid state. When young children void green and excoriating feces, 5 grains of magnesium oxide and 2 grains of rhubarb are very effective.

MAGNESII SULPHAS.

Magnesium Sulphate, Epsom Salt, Bitter Salts. (Formula: $MgSO_4.7H_2O$.)

Description.—Small colorless crystals or needles, of a saline and somewhat cooling, bitter taste. It slowly parts with water of crystallization and becomes whiter. Very soluble in cold and hot water. The crystals closely resemble those of zinc sulphate, but are moister and lack the metallic taste of the latter.

Specific Indications.—Dysenteric, mucoid, or muco-sanguineous alvine discharges, passed with tenesmus and tormina; blood-streaked mucoid stools; fecal obstruction; acute lead poisoning or painter's colic.

Action and Therapy.—Applied locally solutions of Epsom salt soften and cleanse the skin, and facilitate the natural function of that organ. A good cosmetic lotion for use after shaving may be prepared by simple solution of the crystals in water (℥ij to Oj), plain or glycerinated or fortified with hamamelis, bay rum, or rose water. Applied to old and slimy shin ulcers and ulcerated ankles, with deep red or purplish-red, and scaly or mummified tissues, due to varicosis of the veins of the leg, or to eczema rubrum, a lotion of Epsom salt persisted in cleanses the sores and stimulates the circulation and the production of healthy granulation. A sponge bath containing the salt in strong solution gives comfort and reduces temperature in fever and local inflammations, and while said to be but slowly and very little absorbed by the skin seems to favor elimination through that channel to the relief of the kidneys in chronic interstitial nephritis. A magnesia hot sponge bath imparts a sense of well-being after physical exertion. Whenever autoxemia is present or when metabolic processes are imperfect, as in chronic malarial infections and diabetes, with inactivity of the skin, which looks dry, muddy, and infiltrated, a hot sponge bath of magnesium sulphate will arouse the dormant functions and promote elimination of self-generated poisons.

Fomentations of a strong solution of the salt give comfort in erysipelas and dermatitis when the skin is dry, hot, and swollen; and applied hot give relief in acute inflammatory rheumatism, arthritis, epididymitis, neuralgia, neuritis, sciatica, tonsillitis, and croup. Persistent use of the magnesium sulphate solutions has been advised to remove cicatrices of the skin and cornea, and warts, and an injection of the same is useful in gonor-

rhœa of both male and female. Bathing with a solution of Epsom salt and allowing it to dry on the skin is said to defend one absolutely from the visitations of "chiggers". Epsom salt baths should contain about one-half pound to the gallon of water.

Internal. Magnesium sulphate is an active refrigerant cathartic and diuretic. It produces free, watery evacuations, at the same time augmenting the secretion of urine. If taken on an empty stomach it acts within one or two hours; and by many is preferred in *hot* (not warm) water for quick and efficient action. It is not readily absorbed and probably acts, through salt-action, by abstracting the watery constituents from the intestinal circulation. When a derivative effect is desired, as in dropsy of various types, the drug is given in as concentrated a form as possible, using just enough water to thoroughly dissolve the salt, and is most effectual if given in broken doses. Its tendency to nauseate may be obviated by the addition to it of four or five drops of sulphuric acid, and its taste may be masked by coffee. With the addition of the acid its refrigerant effects are lessened and its tendency to gripe or irritate the rectum, or to interfere with the appetite and digestion, are greatly diminished. As a rule Epsom salt should not be administered to old persons and to the feeble on account of the possibility of causing a chill, especially in cold weather.

Under ordinary circumstances magnesium sulphate is an ideal hydragogue cathartic in febrile and inflammatory affections when constipation exists. It is frequently used in broken doses to effect a liquefaction of the stool when there are impacted feces, especially in the cæcum and right ascending colon, with tendency to inflammation and elevated temperature. In peritonitis it is preferred to other purgatives on account of its depleting and refrigerant catharsis. It is one of the most commonly used purgatives in ascites. It is best given in smaller doses, a drachm or two in a small amount of water several times a day. Magnesium sulphate is among the preferred cathartics for use previous to surgical operations. No other saline cathartic can be given so long and so safely as magnesium sulphate. As a rule, however, the dose administered is too large (1 to 2 ounces), and doses of 2 to 4 drachms in hot water or in hot or cold lemonade are equally as efficient and less exhausting. As an occasional cleansing agent it should be given intercurrently with cascara, taraxacum, and other agents to overcome habitual constipation.

Sulphate of magnesium is one of the best of medicines for acute dysentery. If there is marked constipation with only mucoid discharges a drachm may be given in water, and after fecal matter appears in the stools the salt may be continued in about two grain doses until the trouble subsides. If not so constipated at the beginning the following is the best form of administration: ℞ Magnesium Sulphate, ℥j; Specific Medicine Aconite, gtt. iij; Specific Medicine Ipecac, gtt. v to x; Water (or Peppermint Water), q. s., fl℥iv. Mix. Sig.: One teaspoonful every hour. This seldom fails to overcome the constipation of the upper bowel, reduce the fever and inflammation of the lower bowel, relieve the tormina and tenesmus, check the flow of mucus, and arrest any hemorrhagic manifestations that may be present. It is one of the surest of specific means for this disease. Larger doses are said to be valued in amœbic or tropical dysentery, with full doses

of ipecac, given until the mushy stools of the latter are in evidence. We invariably employ sulphate of magnesium in muco-colitis of children, when the stools contain much mucus, barely stained a pinkish color by blood, but which cannot be readily recognized as blood. In small doses it often proves serviceable in urticaria.

A full purge of salts is indicated in cerebral vascular engorgement, œdema of the brain, or intracranial pressure from excess of meningeal fluid. It is also useful in uræmia in conjunction with other measures. The claim has been made that fractional doses of magnesium sulphate or the oxide (1/10 to 1/2 grain), once or twice a day for several weeks, are effectual in removing warts. For acute lead poisoning, with lead colic, the administration of full doses of magnesium sulphate acidulated with sulphuric acid is the universally recognized and best treatment.

The intraspinal use of magnesium sulphate for the control of tetanus and allied disorders has been attended with fatalities and has not as yet become an approved treatment.

MANGANI DIOXIDUM PRÆCIPITATUM.

Precipitated Manganese Dioxide.

Description.—A permanent, fine, heavy, black powder, odorless and tasteless, not dissolved by water or alcohol. *Dose*, 1 to 8 grains.

Action and Therapy.—Manganese dioxide is said to be useful in gastric ulcer and in amenorrhœa and dysmenorrhœa in anemic individuals. As an alterative it has been advised in slow-healing skin affections in strumous subjects, particularly in those who suffer from pyrosis and other gastric disturbances and have a tendency to chlorosis. It should be given in the smaller doses. It is not readily absorbed, but in large amounts may produce poisonous symptoms.

MANGANI SULPHAS.

Manganese Sulphate.

Description.—Colorless or pale rose-colored, transparent crystals, without odor, and having a slightly bitter and astringent taste. Slightly efflorescent in dry air. Very soluble in water; insoluble in alcohol. *Dose*, 1/2 to 5 grains.

Specific Indications.—Ascites, with hepatic disease, and when the result of alcoholism; lax, pendulous abdomen; pale, dirty, leaden-hued skin; diarrhœa; small, mucous passages, with tormina and tenesmus.

Action and Therapy.—Large doses of manganese sulphate produce severe catharsis and sometimes gastro-enteritis. Small doses are stimulant to the liver and intestinal glands. It may be given in ascites due to hepatic diseases, and especially when occurring in old topers. Scudder advised it in small doses in disorders exhibiting a pallid, dirty, leaden-colored tongue, with gastric fullness, sluggish bowel action, and lax, pendulous abdomen; in minute doses (in 1x or 2x trit.), when the tissues are old and feeble and heart action and circulation weak.

MANGIFERA.

The inner bark of the root and tree of *Mangifera indica*, Linné (Nat. Ord. Anacardiaceæ). A native East Indian fruit tree; naturalized in the West Indies. *Dose*, 5 to 60 grains.

Common Name: Mango.

Principal Constituents.—Tannic acid (17 per cent) and an acrid oil.

Preparation.—*Specific Medicine Mangifera. Dose*, 5 to 60 drops.

Specific Indications.—Feeble, relaxed tissues; mucous discharges; chronic dysentery with muco-purulent discharges; red, congested or inflamed fauces.

Action and Therapy.—*External.* Mangifera forms a soothing, astringent gargle for acute or chronic inflammation of the fauces, especially when full, red and congested and intensely painful. It may be used also to alleviate inflammatory conditions of the mucosa of any part of the body or upon excoriations of the skin. Especially is it effective in acute pharyngitis and the follicular and phlegmonous forms of tonsillitis. Too much has been claimed for it in diphtheria, though its use as an adjuvant is not inappropriate, especially if there is either much redness and pain, or relaxation of tissue. In acute rhinitis it may be used as a douche; and in acute inflammation of the uterine cervix it has been employed with advantage. For use upon the nose and throat about two drachms of specific medicine mangifera may be added to two ounces of water.

Internal. Owing probably to its tannic acid, and somewhat to other inherent principles, mangifera is a useful drug in relaxation of mucous tissues, associated with catarrh and diarrhœa and feeble capillary circulation. It appears to be best adapted to entero-colitis and watery diarrhœa. Many value it in passive hemorrhages from the nose, uterus, stomach, intestines, and lungs; and some good therapeutists have declared it of value in hemophilia. One should not, however, expect much in the latter disorder from a drug whose hemostatic properties are evidently mostly due to its tannin. Mangifera is one of the pleasantest forms of administering the latter, which may be of a special type, as there are many tannins. It agrees well with the stomach and seems to promote the appetite and digestion, and apparently is non-constipating. When not contraindicated syrup is a fairly good vehicle for mangifera in throat affections.

MANNA.

The concrete saccharine exudation of *Fraxinus Ornus*, Linné (Nat. Ord. Oleaceæ). A tree of southern Europe. *Dose*, 1 drachm to 2 ounces.

Common Name: Manna.

Description.—Irregular, flattened, longish pieces, of a yellowish-white exterior and nearly white interior, somewhat porous and crystalline-like, having a peculiar odor, a taste sweet followed by feeble bitterness and acridity. It should not contain more than four-tenths part of irregular, yellowish-white, resin-like fragments.

Principal Constituents.—Mannite (90 per cent) with sugar (10 per cent).

Action and Therapy.—Nutritive in small doses and mildly laxative in larger amounts. In doses of one to three drachms for infants and one to two ounces for adults it makes a very pleasant laxative when administered in milk. It is suitable for the constipation of pregnancy. It sometimes causes flatulency and griping. This may be obviated by giving with it any warm aromatic.

MARRUBIUM.

The leaves and tops of *Marrubium vulgare*, Linné (Nat. Ord. Labiatæ). Europe; naturalized in America. *Dose*, 5 to 60 grains.

Common Names: Horehound, Hoarhound.

Principal Constituent.—A bitter principle *marrubiin* ($C_{30}H_{43}O_6$).

Preparations.—1. *Specific Medicine Marrubium. Dose*, 1 to 60 drops.
2. *Syrupus Marrubii Compositus*, Compound Syrup of Hoarhound. *Dose*, 1 to 4 fluidrachms.

Specific Indications.—Chronic irritation of the bronchial membrane with cough and catarrh.

Action and Therapy.—Hoarhound is a stimulating expectorant and tonic, and is adapted to both acute and chronic irritation of the larynx and bronchial tract, and gives added power to respiration. In small doses it is a gastric tonic of considerable value, but given too freely it will act as an emetic and cathartic. A hot infusion is diaphoretic; a cold infusion, diuretic. Hoarhound, usually in the form of a syrup, is useful in hoarseness, coughs, and colds that do not clear up rapidly, chronic bronchial catarrh, and humid asthma. The specific medicine may be used in atonic dyspepsia, especially when associated with bronchial debility. The compound syrup is an agreeable and efficient expectorant for chronic cough. Hoarhound candy is a popular remedy for irritation of the throat with cough.

MATICO.

The leaves of *Piper angustifolium*, Ruiz et Pavon (Nat. Ord. Piperaceæ). A Peruvian shrub.

Common Names: Matico, Matico Leaves.

Principal Constituents.—A bitter principle, *maticin*, and an aromatic camphoraceous volatile oil.

Preparation.—*Tinctura Matico*, Tincture of Matico (℥ijss to Diluted Alcohol, Oj). *Dose*, 1 to 2 fluidrachms.

Action and Therapy.—An aromatic, bitter stimulant of reputed value in catarrhal states, particularly of the stomach and genito-urinal tract. It is seldom used.

MATRICARIA.

The dried flower-heads of *Matricaria Chamomilla*, Linné (Nat. Ord. Compositæ). Wastes of Europe, Asia, and Australia. *Dose*, 1 to 60 grains.

Common Names: German Chamomile, Wild Chamomile.

Principal Constituents.—A dark-blue, aromatic, volatile oil (*Oleum Chamomillæ Æthereum*) and possibly a crystallizable, bitter, anthemic acid, and a crystalline alkaloid anthemidine.

Preparations.—1. *Specific Medicine Matricaria. Dose*, 1 to 60 drops.
2. *Infusum Matricariæ*, Infusion of Matricaria (℥ss to Oj). *Dose*, 1 to 4 drachms.

Specific Indications.—Nervous irritability, with fretfulness, peevishness, impatience, and discontent; morbid sensitiveness to pain and external impressions; sudden fits of temper when menstruating; muscular twitching; fetid, greenish feculent alvine discharges, or when the stools are green and slimy, or of mixed whitish curds and green mucus, associated with flatulence, colic, and excoriation of the anal region; if a child, the head sweats easily and the discomforts of teething, flatulent colic, etc., are transient and intermitting, and the nervousness is relieved by being carried about in the arms.

Therapy.—According to dose and manner of use, matricaria is a stimulant diaphoretic and nerve sedative. Its calmative action is so

satisfactory that even the skeptic in therapeutics becomes a convert to the fact that there is great therapeutic energy in some simple agents which, by usual tests, fail to show decided so-called physiological action. Matricaria, simple and safe as it is, is remedially potent. Could it more generally have taken the place of "soothing syrups", so largely destructive to infant life, the history of baby mortality might have been a less appalling story. No child need be laid in its grave because of its administration.

Matricaria, better known to some as chamomilla, is pre-eminently a child's remedy, especially for the very young child. It has two well-marked, specific fields of action—(1) on the nervous system, subduing irritability; and (2) on the gastro-intestinal tract, allaying irritation. Its influence is well seen upon the infant during the period of dentition. In such conditions it is adapted to the restless, peevish, irritable, discontented, and impatient infant, who is only appeased when carried about in order to quiet its nervousness and unrest. The child needs both sympathy and matricaria, both sound measures in infant therapeutics. In such children it may be equally a remedy for constipation or diarrhœa. In the former case, there is usually hepatic tenderness. In the latter, the discharges may be variously characterized—watery and greenish, slimy, green and slimy, or yellow and white lumps of undigested curds, giving them the well-known name of "eggs and greens". Such stools usually excoriate the child severely, and are accompanied by colicky pain of greater or less severity. The urine is passed with difficulty, and there is more or less bloating of the abdomen. Flatulence is often marked, and the surface is alternately flushed and pale. Under such irritable conditions it proves a useful remedy in infantile dyspepsia, and when teething the child cries out in sleep and there is sometimes a tendency to convulsions. This condition it may ward off by controlling the nervous excitation, but it is of little value after convulsions occur. Sometimes a gently laxative dose of sodium phosphate preceding or accompanying the matricaria will enhance the efficacy of the latter. Matricaria is useful for the swelling of the breasts in the newborn (usually with phytolacca), and in the involuntary passage of urine in the young. For the flatulent colic of early infancy it is one of the safest and most effectual medicines. For this purpose it should not be sweetened.

Matricaria is invaluable in some affections of nervous women, a field in which it is too frequently neglected, perhaps not being considered a powerful enough medicine. In woman or child it is a nerve sedative, and adapted to irritation and not to atony. In the latter months of pregnancy it frequently allays false pains, cough, nervous muscular twitching, and other unpleasant nervous phenomena. In amenorrhœa and dysmenorrhœa, with weighty feeling in the uterus and tympanites, it often relieves, as it does in cases presenting sudden explosions of irascibility, and in those having cramping or labor-like pains and meteorism. The hot infusion is particularly useful in suppressed menstruation from colds, and often controls earache and facial neuralgia from the same cause. The matricaria patient is extremely and morbidly susceptible to pain, is hyperæsthetic, and the nervous apprehension is all out of proportion to the actual pain suffered. This remedy should be resorted to when one is tempted to employ opiates and other more powerful pain relievers.

MEL.

A saccharine substance deposited in the honey comb by the *Apis mellifera*, Linné or Honey Bee (Family Apidæ).

Common Name: Honey.

Description.—A thick, viscous, syrupy, yellowish or yellow-brown fluid, clear when fresh, but losing its translucence with age and depositing crystals. It has an intensely sweet, feebly acrid taste, and a distinctive odor.

Principal Constituents.—Lævulose (fruit sugar), dextrose (grape sugar or glucose) and sucrose (cane sugar), with the first named predominating; also a trace of *formic acid*.

Preparations.—1. *Mel Depuratum*, Clarified Honey.
2. *Mel Boracis*, Borax Honey (Borax, Glycerin, Honey).
3. *Mel Rosæ*, Rose Honey (Fluidextract of Rose mixed with Clarified Honey). *Dose*, ƒ3j to ƒ3ij.

Action and Therapy.—*External.* Honey is sometimes incorporated in poultices for mammitis, fissured nipples, boils and carbuncles, and is added to gargles for irritated conditions of the fauces. Honey of borax and honey of rose are preparations frequently recommended for aphthous ulcers of the mouth and female genitalia. Our experience has led us to regard honey as a barbarous application in sore mouth of infants and young children on account of the vicious smarting it causes. The borax, in weak solutions, is equally as efficient.

Internal. Honey is nutritious, demulcent, diuretic and antiseptic; sometimes it proves laxative. Though extensively used as a food it sometimes occasions unpleasant symptoms, as pyrosis, a peculiar and persistent bellyache, flatulent colic, head symptoms and occasionally diarrhœa and urticaria. It is sometimes incorporated in cough mixtures as an agreeable demulcent, and is occasionally used to allay irritation of the urinary passages.

MELILOTUS.

The leaves and flowering tops of *Melilotus officinalis*, Willdenow (Nat. Ord. Leguminosæ). A common weed found everywhere in the United States. *Dose*, 1 to 30 grains.

Common Names: Yellow Sweet Clover, Yellow Melilot, Yellow Melilot Clover.

Principal Constituents.—An active substance of a vanilla-like odor, *coumarin*, associated with *melilotic acid;* orthocoumaric acid, and a volatile oil, *melilotol.*

Preparation.—*Specific Medicine Melilotus. Dose*, 1 to 20 drops.

Specific Indications.—Idiopathic, atonic headaches and chronic neuralgias; coldness, tenderness, lameness or marked soreness of tissues; painful menstruation or menstrual colic with soreness and coldness; ovarian neuralgia.

Action and Therapy.—Melilotus is a remedy for pain associated with a sensation of coldness of the extremities and marked tenderness, lameness, or soreness to the touch. With these indications it is very effectual in some cases of ovarian neuralgia and dysmenorrhœa. Though it may relieve headache due to gastric disorders, it is best adapted to painful states not resulting from reflexes, but rather those of an idiopathic type. Following the specific indications it has proved a remedy of worth in menstrual and intestinal colic, gastralgia, neuralgia of the stomach, visceral neuralgia, painful dysuria, and sciatic neuritis. It frequently cuts short recurrent neuralgia when induced by cold, and benefits in rheumatoid lameness or soreness.

MENISPERMUM.

The rhizome and roots of *Menispermum canadense*, Linné (Nat. Ord. Menispermaceæ). In woods and hedges in the eastern half of the United States. *Dose*, 5 to 60 grains.

Common Names: Yellow Parilla, Canadian Moonseed, etc.

Principal Constituents.—*Berberine* in small quantity and a large amount of a bitter, white alkaloid, *menispine;* tannin, gum, and resin.

Preparation.—*Tinctura Menispermii*, Tincture of Menispermum (Rhizome, ℥viii; Alcohol (76 per cent), Oj). *Dose*, 5 to 60 drops.

Specific Indications.—"Skin brown, tongue coated at the base, tip red, irregular appetite, constipation" (Scudder).

Action and Therapy.—Yellow parilla is little used, though possessing decidedly active tonic properties. Full doses increase the volume of the pulse, sharpen the appetite, and prove laxative. Excessive doses cause emeto-catharsis. It is a good laxative, bitter and alterative, and may be used with benefit in strumous and chronic arthritic inflammations, when accompanied by fullness of the lymphatic nodes and weak digestion. Its possible value in leucocythemia has been suggested.

MENTHA PIPERITA.

The leaves and tops of *Mentha piperita*, Smith (Nat. Ord. Labiatæ). Europe and the United States. *Dose*, 60 to 120 grains.

Common Names: Peppermint.

Principal Constituents.—A volatile oil (*Oleum Menthæ Piperitæ*) and *menthol.* (See Menthol.)

Preparations.—1. *Oleum Menthæ Piperitæ*, Oil of Peppermint. (A clear, colorless oil having the strong odor and taste of peppermint and giving a sensation of cold when air is drawn into the mouth or water is drunk; soluble in alcohol.) *Dose*, 1 to 10 drops.

2. *Aqua Menthæ Piperitæ*, Peppermint Water. *Dose*, 1 fluidrachm to 1 fluidounce.

3. *Spiritus Menthæ Piperitæ*, Spirit of Peppermint (Essence of Peppermint—10 per cent oil). *Dose*, 5 to 60 drops.

Derivative.—*Menthol.* (See Menthol.)

Specific Indications.—Gastrodynia, flatulent colic, difficult digestion.

Action and Therapy.—*External.* Oil of Peppermint is rubefacient and anodyne. It is used alone or in combination with other oils for the relief of neuralgia and toothache, in both of which it is often very efficient. Its external use has been somewhat superseded by menthol, the camphoraceous body to which oil of peppermint owes most of its virtues. Still it is used largely to relieve local pain, especially that of burns and scalds.

Internal. Peppermint infusion is a very grateful agent to allay nausea and vomiting, and to break up a cold. It forms a part of the well-known *Neutralizing Cordial.* The essence is a common and unexcelled carminative for gastrodynia and the flatulent colic of children, and is used extensively to modify the action and mask the taste of other medicines. Applied by atomization, essence of peppermint and alcohol, equal parts, frequently eases the pain of tonsillitis and gives relief in the cough of acute bronchitis and pneumonia.

MENTHA VIRIDIS.

The leaves and tops of *Mentha spicata*, Linné (*Mentha viridis*, Linné). (Nat. Ord. Labiatæ.) Wild in Europe, and introduced into the United States, growing abundantly in damp grounds; cultivated. *Dose*, 60 to 120 grains.

Common Name: Spearmint.

Principal Constituents.—A volatile oil (*Oleum Menthæ Viridis*), resin, and gum.

Preparations.—1. *Oleum Menthæ Viridis*, Oil of Spearmint. *Dose*, 1 to 10 drops.
2. *Spiritus Menthæ Viridis*, Spirit of Spearmint (Essence of Spearmint). *Dose*, 5 to 60 drops.
3. *Aqua Menthæ Viridis*, Spearmint Water. *Dose*, 1/2 to 1 fluidounce.
4. *Infusum Menthæ Viridis*, Infusion of Spearmint (Spearmint, ℥j to Water, Oj). *Dose, ad libitum.*

Specific Indications.—Scanty secretion of high-colored urine; simple nausea.

Action and Therapy.—Spearmint is used much like peppermint, though it is somewhat inferior as a carminative. It is especially valuable to allay nausea, particularly that following a sick headache. The warm infusion is a very agreeable and simple medicine for an acute cold. Spearmint is one of the surest and kindliest diuretics if given in cold infusion; or the essence may be used well diluted with cold water. We frequently employ it to render acetate of potash more effective as well as pleasanter to take. The spearmint increases the watery flow; the potash salt the solids of the urine. Spearmint may be used in strangury, suppression of urine, and scalding of urine, with difficult micturition.

MENTHOL.

Menthol.

A secondary alcohol obtained from the oil of *Mentha piperita*, Linné, or from other oils of mints. It should be kept in well-stoppered bottles, and in a cool place.

Description.—Colorless needle or prismatic crystals with a strong odor and taste characteristic of peppermint, very soluble in alcohol, ether, and chloroform, and slightly soluble in water. It gives a feeling of warmth when tasted, followed by a sensation of cold when air is inhaled or water is drunk. *Dose*, 1/8 to 2 grains.

Specific Indications.—Pruritus; nausea and vomiting.

Action and Therapy.—*External.* Menthol is a local antiseptic, anæsthetic and antipruritic. It is used with great success in various disorders attended with itching and pain. It may be used alone or rubbed up with camphor, chloral hydrate, or phenol in combinations desired, and painted upon painful surfaces or employed to obtund the pain in a carious tooth. In alcoholic or oil solution it is an unexcelled application for the itching of hives, pruritus vulvæ et ani, eczema, ringworm, or herpes zoster. For pain and cellular inflammations it is very effectual in burns and scalds, insect bites and stings, earache, neuralgia, boils, carbuncles, and the surface pains of sciatica. The pain of local and superficial neuralgias and of arthritis, simple, rheumatic, or gonorrhœal, may be relieved by painting upon the affected surface a combination of hydrated chloral, thymol, and menthol. A 20 per cent mentholated petrolatum may be used as a stimulating agent when there is a lack of cerumen in the auditory canal, and for boils in that passage a 20 per cent oil solution is very comforting. A 10 to 20 per cent solution in liquid petrolatum or olive oil gives relief in coryza and hay fever, or may be sprayed into the larynx for the relief of the distressing pain of laryngeal tuberculosis. An albolene spray of menthol

is largely employed in inflamed and irritable conditions of the nose and throat—ozæna, catarrhal sore throat, asthma, chronic bronchitis, and whooping cough. The vapor is useful to allay harassing and irritable bronchial cough.

Internal. Minute doses of menthol relieve nausea and vomiting, as of pregnancy and seasickness. It is sometimes of value in hiccough. It should not be used in large doses internally because of the profound nervous disturbances it may occasion.

METHYLTHIONINÆ CHLORIDUM.

Methylthionine Chloride, Methylene Blue.

Description.—Deep green, crystalline powder, or bronze-lustrous crystals; freely soluble in water and alcohol and less so in chloroform, the solutions being a deep blue. *Dose* (average), 2 1/2 grains. ☞ This compound *should not be confounded with Methyl Blue* or *Pyoktanin*, these being for local use only. *Dose*, 1 to 4 grains.

Action and Therapy.—Reputed antiseptic, anodyne, hypnotic, and diuretic. Its chief use has been to clear the urethra of gonococci, in which it sometimes appears to be successful. It stains the urine a deep blue, gradually changing it to a greenish-blue or sea-water tint before the color is completely discharged. A single dose leaves its impress upon the urine for several days. This property has made it of diagnostic value to test the rate of renal excretion. Intramuscular injection of one grain in ten minims of water should show the color of the drug in the urine in fifteen to twenty minutes and persist for thirty-six hours. For a similar purpose it is injected into the pleural and peritoneal cavities to determine whether the effusion is being removed. The method employed is to inject from one to three grains and administer a purge. If the kidneys are healthy and no color appears in the urine, the presumption is that absorption is not taking place because of occlusion by means of inflammatory exudates.

Methylene blue, though less powerful than quinine, is said to destroy the malarial plasmodia and to have been effective in intermittent malarial fever, when quinine is badly borne or is unsuccessful. It has been used also as an anodyne and calmative in migraine, alcoholic neuritis, and to relieve the pains of locomotor ataxia; and to allay excitement in mania and in paretic dementia it has given rest simulating that of natural sleep. Should methylene blue occasion headache, nausea, dizziness or strangury, a dose of powdered nutmeg (about 20 to 30 grains) is said to correct these unpleasant symptoms. Its former use to relieve pain and shrink malignant growths is now seldom invoked. The dose of methylene blue is one to four grains, in capsules, every four hours; children, less in proportion and only in malarial affections.

MITCHELLA.

The whole plant of *Mitchella repens*, Linné (Nat. Ord. Rubiaceæ). Dry woods, hemlock forests, and damp places in the United States. *Dose*, 5 to 60 grains.

Common Names: Partridgeberry, Squawberry, Squaw-vine, Checkerberry, Deerberry, One-berry.

Principal Constituent.—An undetermined saponin-like body. No alkaloid, glucoside, nor volatile oil present.

Preparations.—1. *Specific Medicine Mitchella. Dose*, 5 to 60 drops.

2. *Syrupus Mitchellæ Compositus*, Compound Syrup of Partridgeberry (Mothers' Cordial). (Contains Mitchella, Helonias, Viburnum Opulus and Caulophyllum, Brandy, Sugar and Essence of Sassafras.) *Dose*, 2 to 4 fluidounces, 3 times a day.

Specific Indication.—As a partus præparator.

Action and Therapy.—Based upon the practice and traditions of the American Indians this plant was eagerly adopted into domestic and early botanic and Eclectic therapy. It is believed by some to have a salutary influence upon the pregnant woman, easing many of the distresses incident to her condition, giving a sense of well-being and strengthening her for the ordeal of child birth. If it has any virtue it lies in quieting nervous irritability and giving a psychologic balance throughout the latter months of pregnancy. There seems to be reliable testimony to the effect that it assists in sustaining against miscarriages where such accidents have previously occurred. As a female regulator it has also had many devoted advocates. The Mother's Cordial is a popular and more rational preparation.

MONARDA.

The leaves and flowering tops of *Monarda punctata*, Linné (Nat. Ord. Labiatæ). Indigenous to the greater part of the United States, in sandy fields and barrens.

Common Name: Horsemint.

Principal Constituent.—A volatile oil (*Oleum Monardæ*), a pungent, aromatic, yellowish to yellowish-red or brown oil; soluble in alcohol, and depositing the stearopten *thymol* ($C_{10}H_{13}OH$) (monardin) (25 to 56 per cent).

Preparations.—1. *Oleum Monardæ*, Oil of Monarda. *Dose*, 2 to 5 drops, on sugar.
2. *Infusum Monardæ*, Infusion of Horsemint, (℥j to Water Oj.) *Dose*, fl℥ss to fl℥ij.

Derivative.—*Thymol.* (See *Thymol.*)

Action and Therapy.—*External.* Locally applied the oil is rubefacient, and if too closely or long applied painfully vesicant. It has been successfully used in local neuralgias.

Internal. Infusion of monarda has long been a popular remedy for retarded menstruation from cold. Both the plant and its oil, which is sharply pungent and diffusive, are stimulating, carminative, antiemetic, and diuretic; in hot infusion diaphoretic. Both may be used to relieve nausea and vomiting even when there is diarrhœa, in flatulent distention of the bowels, in the tympanites of typhoid fever, and the catarrhal vomiting of the drunkard. It checks the serous diarrhœa of debility, and tends to promote rest and sleep from exhaustion when associated with nervous excitation. Monarda has recently come into renewed prominence as an available source of thymol, now largely used as the most generally effective agent against hookworm. Oil of Monarda is an ingredient of domestic preparations lauded for their asserted effectiveness in pertussis.

MYRICA.

The bark and wax of *Myrica cerifera*, Linné (Nat. Ord. Myricaceæ). Dry woods and open fields from Canada to Florida. *Dose*, 5 to 60 grains.

Common Names: Bayberry, Waxberry, Candle Berry, Wax-Myrtle.

Principal Constituents.—Tannic and gallic acids, resins, bayberry tallow (from fruit), 32 per cent; *myricinic* and lauric acids.

Preparation.—*Specific Medicine Myrica. Dose*, 1 to 60 drops.

Specific Indications.—Profuse mūcous discharges, with atony of the circulation; sore mouth and sore throat.

Action and Therapy.—*External.* Bayberry, in powder, decoction, or specific medicine, may be applied for the relief of spongy, flabby, and bleeding gums, the sore throat of scarlatina with enfeebled and swollen

tissues, and to aphthous and indolent ulcerations. As an injection it is valued by some in atonic leucorrhœa.

Internal. Bayberry is a stimulating astringent. In full doses it is emetic. It is a remedy of considerable value in relaxed and flabby conditions of tissues with hypersecretion. In small doses (2 to 5 drops of specific medicine) it stimulates the gastro-intestinal glands, favors digestion and imparts tone, thereby increasing blood-making and nutrition. In doses of 5 to 20 drops it is a decided gastric stimulant, and as such may be used in chronic gastritis. It is also of value in chronic catarrhal diarrhœa, muco-enteritis, and typhoid dysentery, though the latter is not encountered as much as in former years. It may be given internally, as well as used locally upon the throat, in scarlet fever, in the latter stages, when a flabby and enfeebled rather than highly inflammatory condition exists. As a rule bayberry should not be employed in active conditions, but rather in debility of the mucosa, with feeble venous flow and full, oppressed pulse.

MYRISTICA.

The ripe seeds of *Myristica fragrans*, Houttuyn, deprived of their testa (Nat. Ord. Myristicaceæ). Molucca Island; and cultivated in the tropics. *Dose*, 5 to 15 grains.

Common Name: Nutmeg.

Principal Constituents.—A fixed (25 to 30 per cent) and a volatile oil (*Oleum Myristicæ*, 2 to 8 per cent). *Dose* of volatile oil, 1 to 5 drops.

Preparation.—*Specific Medicine Nutmeg. Dose*, 1 to 15 drops.

Action and Toxicology.—An aromatic stimulant and carminative in small doses; larger doses produce nervous sedation and are soporific. Death has resulted from large doses (more than three drachms), the chief symptoms being headache, coldness, and collapse, drowsiness and indisposition to muscular movements. Diuresis is apt to be increased, though in one case it was entirely suppressed. (See author's report of case of poisoning in *Eclectic Medical Journal*, 1891, page 125.)

Therapy.—*External.* An ointment containing the finely powdered nut, or the volatile oil sometimes proves obtundant to painful piles. Grated upon a larded cloth and applied warm we have found it to give prompt and grateful relief in soreness of the chest attending an acute cold or the beginning of acute respiratory inflammation. It may also be used as a spice poultice to the abdomen in painful bowel affections from cold. A liniment of oil of nutmeg (1) and olive oil (3) is regarded by some as an efficient parasiticide for mild types of ringworm.

Internal. Both the powdered nut and the oil are good carminatives and may be used to allay nausea, vomiting, and gastric pain, and to check flatulent colic and serous diarrhœa. The grated nut is in frequent domestic use to flavor foods for the sick, and it and the oil in prescription pharmacy to aromatize sleeping mixtures.

MYRRHA.

The gum-resin obtained from one or more varieties of *Commiphora* (Nat. Ord. Burseraceæ). Region of Gulf of Aden and the Red Sea, Africa, and Arabia. *Dose*, 1 to 15 grains.

Common Names.—Myrrh, Gum Myrrh.

Description.—Brownish-yellow or reddish-brown tears or masses, covered with a brownish-yellow dust; taste: bitter, acrid, and aromatic; odor: balsamic. Soluble in alcohol; forms an emulsion with water. *Dose*, 1 to 30 grains.

Principal Constituents.—A resin, *myrrhin*, 23 to 40 per cent; a volatile oil, *myrrhol*, 2 to 8 per cent; gum, 40 to 60 per cent, and a bitter principle.

Preparation.—*Tinctura Myrrhæ*, Tincture of Myrrh (Myrrh, 20 per cent). *Dose*, 1 to 30 drops.

Specific Indications.—Mucous membrane pale and lax; tonsils enlarged and spongy; throat pale and tumid; chronic bronchitis with profuse secretion of mucus or muco-pus, difficult to expectorate; soreness and sponginess of the gums; ptyalism; weight and dragging in pelvis in females; leucorrhœa; muscular debility.

Action and Therapy.—*External.* Myrrh is the best local application for spongy and bleeding gums and is effective in mercurial and other forms of salivation. The tincture may be diluted with about 6 to 10 parts of water. It may also be used with benefit when the throat is sore and exhibits aphthous or sloughing ulcers, and in chronic pharyngitis with tumid, pallid membranes and elongated uvula. In spongy, enlarged tonsils it is an ideal topical medicine. After the removal of tonsils the following gives great relief from pain and deodorizes the fetor: ℞ Tincture of Myrrh, fℨss; Asepsin, gr. x; Echafolta, fℨij; Glycerin, fℨij; Water, q. s., fℨiv. Shake. This may be applied by means of an atomizer. This combination is also a good mouth wash and dentifrice and minimizes the possibility of pyorrhœa alveolaris. Myrrh, in powder, is often added to dentifrices.

Internal. Myrrh is a stimulant to mucous tissues and should not be used, as a rule, in active inflammatory conditions. Small doses promote digestion and prove antiseptic to the intestinal canal. Large doses quicken the pulse, raise the temperature, cause gastric burning, great sweating and prostration; vomiting and purgation may follow. Myrrh is a remedy for enfeebled conditions with excessive mucous secretion, exhibiting its restraining power especially upon the bronchial and renal mucosæ. It is of much value in chronic bronchitis with relaxation of tissues, profuse, unhealthy and exhausting secretion and difficulty in raising the sputa. Locke advised the following: ℞ Compound Tincture of Myrrh and Capsicum, fℨij; Syrup of Wild Cherry, Syrup of Senega, aa, fℨij. Mix. Sig.: One teaspoonful every three hours. This acts kindly upon the stomach and sustains the strength of the patient. The same combination often relieves the asthma of the aged.

Myrrh is useful in chronic gastritis and atonic dyspepsia, with full, pale tongue and membranes, and frequent mucous stools accompanied by flatulence. It acts well with the simple bitters, especially gentian.

Myrrh is probably emmenagogue, though much of its reputation as such has been acquired in anemic states in which it has been administered conjointly with iron and aloes. It is used in diseases of women when there is weight and dragging in the pelvis and leucorrhœa; and in suppression of the menses in anemic girls. For the type of amenorrhœa dependent upon uterine torpor and constipation Locke advised the following: ℞ Myrrh, gr. xxx; Aloes, gr. x; Macrotin, gr. x. Mix. Ft. Pil, No. 20. Sig.: One or two pills, three times a day. Myrrh is an ingredient of the celebrated Griffith's Mixture (Mistura Ferri Composita) for the amenorrhœa of chlorosis and other forms of anemia; and of the Compound Pills of Rhubarb (Pilulæ Rhei Compositæ).

NITROGENII MONOXIDUM.

Nitrogen Monoxide, Nitrous Oxide, Nitrous Oxide Gas, Laughing Gas.
(Formula: Na_2O.)

Description.—A colorless, slightly odorous and sweetish gas, compressed into metallic cylinders for convenient use. It dissolves somewhat in water especially at low temperatures.

Specific Indication.—To produce transient anæsthesia for very quick operations.

Action.—Among anæsthetics nitrous oxide stands remarkable for its quickness and brevity in action, and its comparative safety. The death rate from this agent is estimated at 1 in 100,000. Though seldom fatal, occasionally untoward results follow its administration, among them being convulsions, coma lasting several days, paralysis, hysteria, and albuminuria, though these effects are exceedingly rare. The first effect of the inhalation of nitrous oxide gas is a general stimulation of the body with accelerated, strong pulse, quick, shallow breathing, a tingling sensation throughout the system, uncommon mental activity, and a pale countenance. After inhaling the gas for a period less than two minutes in duration, stertorous breathing ensues, the face becomes cyanotic, and loss of consciousness and sensation follows. If the inhalation be withdrawn before the latter effects are produced, a stage of intoxication is induced. Muscular rigidity or twitchings are sometimes observed, and occasionally hysterical manifestations and erotic actions take place. The high state of excitement produced, causing the individual to sing, make speeches, or to laugh immoderately, has given to this agent the popular name of "laughing gas." Occasionally one becomes violent under its influence. Its effects are quickly over as soon as the gas is withdrawn. Anæsthesia is produced by the direct action of the gas upon the cerebral cortex, and in part to the deprivation of oxygen supply to the blood during its administration. It has no effect upon the heart and blood, but arterial pressure is increased indirectly by the asphyxia produced. Unlike ether or chloroform, complete anæsthesia may obtain often without the abolishment of the corneal reflex.

Therapy.—Nitrous oxide was discovered by Priestley in 1776. It remained of interest to the experimental chemist only until some time after Sir Humphrey Davy, in 1800 (*Elements of Chemistry*, by Lavoisier, 1802, Vol. II), discovered its wonderful anæsthetic action when inhaled. Then it became a curiosity, and under the name of laughing gas, remained such until Dr. Horace Wells (1844), of Hartford, Conn., first used it to annul pain during the extraction of teeth. Nitrous oxide is used by inhalation only, and is obviously employed only where transient or quick operations are to be performed. It may be safely administered to young or old, and scarcely any condition, except atheromatous arteries, contraindicates its use. The operative stage may be known by the loss of sensation (see above) when the conjunctiva is touched, and by the stertorous breathing. It is best inhaled by a mouth-piece having a valve to permit expiration, the apparatus being connected by tubing to the container, which is generally a rubber bag, or wrought-iron cylinder. The nostrils should be held closed. The chief use to which it has been put up to recent years is in dentistry to allay the pangs of teeth extraction. Opening of abscesses, operations for cataract, and other operations requiring not more than 20 minutes' time,

may be performed under its influence. It has been used to mitigate the sufferings of labor, to relieve neuralgia and other painful affections. The difficulty of transporting the containers makes this anæsthetic of little value outside of hospitals and the physician's and dentist's office. The brevity of its effects preclude its use in prolonged operations. Owing to the erotic dreams sometimes produced by it a third person should always be present when it is administered to women, many innocent operators having been unjustly charged with violating the proprieties of life under the mistaken anæsthesia impressions or sexual hallucinations of the patient.

Within recent years nitrous oxide has been used quite extensively for beginning anæsthesia, to be later completed under ether or chloroform. It prevents the unpleasant preliminary effects of those drugs, owing to its quickness in producing the anæsthetic stage. This is of particular advantage to women and children who are nervous and apprehensive. Nitrous oxide has been revived in hospitals as an obtundant to mitigate the pains of childbirth, but in many surgical operations is being supplanted by a mixture of nitrous oxide and oxygen, or of nitrous oxide, oxygen, and ether, by which operations can be prolonged indefinitely with just sufficient anæsthesia to avoid the profound effects of ether or chloroform alone. Special measuring and mixing apparatus is employed in its administration. The latter methods are ideal, bringing the patient quickly under control and keeping him just "under" with marked composure and without the distressing facial appearance caused by the two great anæsthetics—chloroform, and especially ether, when given alone.

NUX VOMICA.

The dry, ripe seeds of *Strychnos Nux vomica*, Linné (Nat. Ord. Loganiacæ). According to the U. S. P. it should contain at least 2.5 per cent of nux vomica alkaloids. India, along the Coromandel Coast, Ceylon, and other parts of the East Indies. *Dose*, 1/20 to 2 grains.

Common Names: Poison Nut, Dog Button, Quaker Buttons.

Principal Constituents.—The powerfully poisonous alkaloids *strychnine* ($C_{21}H_{22}O_2N_2$) and *brucine* ($C_{23}H_{26}N_2O_4$) in union with igasuric acid. Loganin, a glucoside, is inert.

Preparations.—1. *Specific Medicine Nux Vomica. Dose*, 1/30 to 5 drops. (*Usual form of administration:* ℞ Specific Medicine Nux Vomica, gtt. v to xv; Water, q. s. ℥iv. Mix. Sig.: One teaspoonful every 1 to 3 hours.)

2. *Tinctura Nucis Vomicæ*, Tincture of Nux Vomica. *Dose*, 1 to 15 minims.

Specific Indications.—Atonic states; tongue pallid and expressionless, uncoated, or with a yellowish pasty coat; yellowness of conjunctivæ; yellow or sallow countenance, and yellowish or sallow line around the mouth; fullness and dull pain in the right hypochondrium; pain in the right shoulder, with colicky pain, pointing toward the umbilicus; menstrual colic; constipation; diarrhœa of atony; functional forms of paralysis.

Action.—In small doses strychnine (and nux vomica) has but little apparent effect other than that of a powerful bitter and general tonic. Larger doses greatly stimulate and still further heighten bodily tone. Full medicinal doses increase reflex action, quicken the rate of respiration, and enlarge the capacity of the lungs, augment the force, rate, and volume of the pulse, raise arterial pressure, give increased sharpness to sight, hearing, and smell, and cause general irritation and excitement. It acts directly upon the heart-muscle and its ganglia, stimulating them, but its lethal doses depress. The arterial rise is due to vaso-motor stimulation.

It is one of the most powerful of respiratory stimulants, acting through the centric center of respiration, and not only increases the rate and power of breathing, but enlarges the lung capacity. Its action upon the nervous system is chiefly upon the ganglionic cells of the motor tract of the spinal cord, and in poisonous doses causes such profound irritation or excitement as to render them extremely responsive to the slightest stimuli, resulting in tetanic convulsions. Most likely it also feebly stimulates the sensory tracts and slightly increases the power of nerve conduction. Upon the cerebrum it is almost without action, except possibly to stimulate to greater acuity the nerve centers of the special senses. Temperature is scarcely affected by ordinary doses of strychnine. While a portion of strychnine is oxidized in the body, the drug is excreted by the kidneys unchanged and as strychnic acid.

Strychnine, brucine, and nux vomica are all extremely energetic poisons, acting as such chiefly by excessive stimulation of the spinal cord and the medulla. Strychnine is the most powerful and quickest, brucine considerably less so, while nux vomica is slower than strychnine, but almost identical in action, and if the quantity be sufficient, equally certain to cause death.

The slightest observable effects from small doses of these drugs occasion slight twitching of the muscles of the arms and legs, especially during sleep. This is accompanied by restlessness, some anxiety, quickening of the pulse, and generally slight sweating. Sometimes the action of the bowels is increased, and there is a greater quantity of urine secreted, which is voided with more than ordinary frequency. The sexual passions may be excited. In larger doses, but not large enough to kill, a sense of weakness and heaviness is experienced, with depression of spirits, trembling of the limbs, and a slight rigidity or stiffness upon attempted movement. Inability to maintain the erect position is common, and a light tap upon the ham, given suddenly, will be followed at once by a slight spasm, and the patient will no longer be able to stand. These are toxic and near-lethal effects. Lethal doses bring on the most violent of spasms and death (see below).

The long-continued use of strychnine, in excessive amounts, tends to impair the digestive organs, and while small doses favor diuresis, large quantities impair that function by producing spasms of the bladder muscles.

Toxicology.—Lethal doses of nux vomica or strychnine produce at first marked uneasiness and restlessness, with more or less of a sense of impending suffocation. Tremors of the whole body are observed. Suddenly there is violent starting of the muscles, and the ensuing convulsions are of such great violence as to throw the patient off the bed, or to a considerable distance. Nearly all the muscles are affected at the same time; the exception being, perhaps, of those of the jaws, which become locked last. The *risus sardonicus* is present and gives to the countenance a fiendish expression. Opisthotonos to an extreme degree takes place, the body resting upon the head and heels, with the hands clenched and the feet inverted. The convulsion is distinctly tetanic and is followed by a brief period of rest, during which the patient suffers acutely from pain, weariness, and rending of the limbs. He is conscious at all stages of the poisoning except just preceding death. During the intervals of repose from the convulsions there is acute sensibility and dreadful alarm. Upon the re-

newal of attack the patient may cry out from the violence of the spasmodic grip upon the respiratory organs. The slightest sound, draught of air, or beam of light will at once renew the convulsions. The spasms succeed each other rapidly, death usually taking place after three or four convulsions. Death may occur during the interval from exhaustion, or paralytic asphyxia, or during the vise-like grip upon the respiratory muscles and the heart from cramp asphyxia. The body stiffens after death and this rigidity has been known to persist for months.

The smallest doses known to have produced death are 30 grains of nux vomica (equal to about 1 seed, or 1/3 grain of strychnine); 3 grains of the extract of nux vomica; and 1/16 grain (child) and 1/2 grain of strychnine (adult). Death usually occurs in about two hours, or may be delayed for six hours. If six hours have elapsed without death the patient is likely to recover.

In poisoning by strychnine (or nux vomica) the patient must be kept absolutely quiet. No noises should be permitted, nor even a draught of air be allowed to strike the body, nor a strong beam of light the eye. Emetics are only admissible very early before convulsions have occurred. If the patient is seen immediately after taking the poison the stomach should be repeatedly washed out with a solution of permanganate of potassium, or of tannin, or strong table tea. If an emetic is to be used apomorphine is to be preferred. Lard, sweet oil, milk, or charcoal may be given with a view of enveloping the poison and retarding its absorption. Chloroform is the best agent to control the convulsions, but should be administered between spasms while the patient is able to inhale. No inhalation can take place during the convulsions. Amyl nitrite is also useful. Large doses of bromide of potassium (60 grains) and chloral hydrate (30 grains) may be given per rectum. King believed camphor antidotal to strychnine and cited its saving effects upon animals to prove his contention. Artificial respiration is useful, but if resorted to the body must be grasped firmly as it is then less likely to excite spasms than is light and superficial contact with the skin. If a very large dose of the poison has been swallowed death is almost inevitable as its action is usually in full force in fifteen minutes, and as a rule, long before medical aid can be procured. Circumstances, however, alter the rapidity of poisoning, as the manner of taking the drugs, the contents of the stomach, and the facility for absorption, hence every effort should be made to sustain life even in apparently hopeless cases. Nux vomica poisons more slowly than the strychnine salts.

Therapy.—As a rule nux vomica is more largely used in disorders of the gastro-hepatic tract than is strychnine; while strychnine is more generally preferred for nervous, sexual, and bladder disorders. For cardiac and respiratory dyspnœa, shock, and other emergencies, strychnine, hypodermatically administered is by far the quicker and better procedure. In all the conditions named on pages 488 and 489 (and these have been sufficiently pointed out) either nux vomica or the alkaloidal salts may be used, with the almost complete preference for the nux vomica in the stomach and bowel disorders. For the uses of the alkaloid in disorders of the nervous system see *Strychninæ Sulphas.*

Nux vomica should not be given for long periods without intervals of rest, and strychnine should be reserved for an emergency remedy and never given, as it is, too frequently, for long periods as a nerve bracer. Remember, it is a powerful stimulant, but stimulates to exhaustion, causes prolonged erethism, and often invokes a low-running fever. The best dose of nux vomica for general purposes is the fractional, at most not to exceed one drop of the specific medicine.

Nux vomica is the most important remedy for atony and relaxation of the stomach and bowels and disorders dependent thereon. The condition is never one of irritation from offending food, or from active hyperæmia, or ordinary congestion, and with rare exceptions of inflammation, even of subacute type. But there is very marked nervous irritability due to atony of the muscular coats, irresponsive glandular action, and depression of spinal and vagal innervation. The tongue is pale and expressionless, and may be pasty and have a yellow coating. There may or may not be nausea or vomiting, or both, there is a sallow or yellow border around the mouth, a general sallow complexion, and evident hepatic malfunction. Quite often the conjunctivæ are yellowish, there is pain extending to beneath the right shoulder blade, and a colicky type of intestinal pain with flatulence, pointing from the gall-bladder to the umbilicus. With some, or the totality of these indications, it proves a remedy of great power in a variety of digestive and intestinal wrongs, among which may be named simple atonic indigestion, pyrosis, flatulent colic, nervous gastric debility, chronic diarrhœa, cholera infantum, muco-enteritis, and chronic non-inflammatory diarrhœa. In the three last named disorders, the child is weak, apathetic, and listless, the stools pass unnoticed and painlessly, or perhaps may be preceded by a slight umbilical colic. For colic, nux vomica is second only to colocynth, and preferable when the above indications are present.

Nux vomica is one of the best agents for so-called chronic gastritis of various types and origins, but all of an atonic character. With other bitter peptics, especially hydrastis, it is especially valued in chronic atonic dyspepsia. ℞ Specific Medicine Nux Vomica, gtt. x; Glycerin, fl℥ij; Phosphate of Hydrastin (or Specific Medicine Hydrastis, fl℥i), gr. x; Water, q. s., fl ℥iv. Mix. Sig.: One teaspoonful every four hours. The pale tongue, bad taste and pallor about the mouth will guide to its selection. In rare cases in which the tongue is of normal redness it may be alternated with hydrochloric acid in minute doses. When the liver involvement is prominent—with yellow, pasty tongue, hepatic tenderness and icteric coloration of the eye, Specific Medicines Leptandra or Chionanthus may be substituted for the hydrastis preparations. Not alone does nux vomica overcome the irritability upon taking food, but it overcomes dilation of the organ from relaxed musculature and the associated flatulent distention. Drop doses of the specific medicine in a full glass of cold water taken upon an empty stomach upon arising in the morning, and insistence upon an absolutely rigid adherence to a regular time for attempting defecation, will aid marvelously toward a cure of obstinate habitual constipation. Drop doses several times a day is also good medication in the dyspepsia of inebriates, with loss of digestive power and relaxation, and either stubborn constipation or oft-recurring diarrhœa. Nux vomica will sometimes re-

lieve spasmodic conditions of the bowels when due to lack of peristalsis, with obstinate constipation, and it also occasionally relieves colic and costiveness caused by lead. But few doses of nux vomica, given in hot water, will be required to cut short an attack of infantile colic when due to torpid digestion; and the remedy is direct in relieving borborygmus in women with relaxed and weak abdominal walls and intestinal ptosis. It is sometimes of greater advantage when given in trituration with milk sugar, carbo-vegetabilis and asepsin, when fermentation of food with belching of gases is prominent.

In that form of so-called congestion of the hepato-splenic circuit due to weakness and sluggish portal circulation the drug is promptly effective. The congestion here is not active, but rather a stagnation due to atony and poor innervation. Nux vomica is the most commonly employed remedy to relieve that condition comprehended in the general and somewhat vague term "biliousness", a state best described by the totality of gastro-hepatic symptoms included in the specific indications at the head of this article. It should be borne in mind that in the stomach and bowel disorders requiring nux vomica or strychnine, there is always a feeble and sluggish circulation, capricious appetite, faulty digestion, irregular bowel action, and depressed spinal and sympathetic innervation. When these are present it is a most decidedly beneficial remedy. Glyconda or neutralizing cordial is a good vehicle for the administration of nux vomica to children when sugar is not contraindicated.

Nux vomica, and more particularly strychnine, are the leading remedies for amblyopia due to alcohol and tobacco; and both are valuable in eye strain, especially of the type of muscular asthenopia. Aggravations of eye and ear disorders, when due to general systemic atony, are nearly always mitigated by it. Foltz declared it the best remedy for purulent otitis media with general lack of tone, and advised it in chronic conjunctivitis and phlyctenular keratitis due to the same cause.

Both nux vomica and strychnine are very serviceable in the urinal incontinence of children, and of the aged, when due to a relaxed or paralyzed sphincter, with feeble circulation. Conversely both are remedies for paralytic retention of urine; and in catarrh of the bladder with marked muscular and nervous depression. Both stimulate the sexual organs and have, therefore, been given with varying success in impotence, spermatorrhœa, and sexual frigidity of women. When coupled with abstention from sexual excesses good results are observed. When there is anemia, constipation, and general torpor, then these drugs, together with iron, sometimes rectify amenorrhœa. With cramps, chilliness, and premature flow, and where there is great bodily weakness, they may be administered for the relief of dysmenorrhœa and in menstrual colic, while for leucorrhœa with heavy yellow discharges and marked nervous debility they greatly assist other specific measures in restoring a normal condition.

Nux vomica is a valuable auxiliary in the treatment of chronic alcoholism, especially in those of a robust constitution, but with great nervous excitability and disposition to indulge in periodical sprees. We have given the following with excellent results: ℞ Specific Medicine Belladonna, gtt. xx; Specific Medicine Nux Vomica, gtt. xxx; Specific Medicine Capsicum, gtt. x; Water q. s. fℨiv. Mix. Sig.: One teaspoonful every four hours.

ŒNANTHE.

The root of *Œnanthe crocata*, Linné (Nat. Ord. Umbelliferæ). A poisonous swamp plant of western and southern Europe. *Dose*, 1/8 to 1/2 grain.

Common Names: Water Hemlock, Water Lovage, Hemlock Dropwort, Dead Tongue, Water Dropwort.

Principal Constituent.—An exceedingly toxic resin, soluble in alcohol but not in water.

Preparation.—*Specific Medicine Œnanthe. Dose*, 1/20 to 1/2 drop.

Action and Therapy.—Small doses of œnanthe (5 drops of the specific medicine) may cause violent headache, dizziness, delirium, and other unpleasant symptoms. The fresh plant produces gastro-enteritis and convulsions, often with fatal results. It has been advocated for use in epilepsy, but its exact symptomatology has never been satisfactorily determined. It must be used in fractional doses, never to exceed 1/2 minim. It probably acts best when there is anemia of the brain, and has been suggested in maladies resulting from malnutrition and anemia of the cerebrum and cord.

ŒNOTHERA.

The whole plant of *Œnothera biennis*, Linné (Nat. Ord. Onagraceæ). A common plant in waste places in the United States. *Dose*, 5 to 60 grains.

Common Names: Evening Primrose, Tree Primrose.

Principal Constituents.—Tannin and an abundance of mucilage; also potassium nitrate and ænotherin, a mixture of substances not well determined.

Preparation.—*Fluidextractum Œnotheræ*, Fluidextract of Œnothera. *Dose*, 5 to 60 drops.

Specific Indications.—Dirty, sallow, full and expressionless skin and tongue, the latter being unnaturally large; face dull and apathetic, and patient gloomy and despondent; dyspepsia with vomiting of food, gastric distress, and frequent desire to urinate.

Action and Therapy.—Œnothera is but little used, but has been suggested by Scudder as useful in gastro-hepato-splenic disorders, with the symptoms named above. Webster believes it may prevent ulceration of Peyer's patches. It is probably of some value in gastric distress following meals, with the gloomy and melancholic state of mind which frequently accompanies dyspeptic conditions. It has also been advised in pelvic fullness and torpor in women. Undoubtedly it does relieve the desire to frequently pass urine and has been used after gonorrhœa for this purpose.

OLEUM CADINUM.

Oil of Cade, Cade Oil, Juniper Tar Oil, Oleum Juniperi Empyreumaticum.

A product of the dry distillation of the wood of *Juniperus Oxycedrus*, Linné (Nat. Ord. Pinaceæ).

Description.—A brownish or dark-brown, clear, thick fluid, having a tarry odor, and a burning empyreumatic, bitterish taste. Almost insoluble in water, partly soluble in alcohol, and wholly in chloroform and ether. It mixes well with fats and petrolatum.

Action and Therapy.—Oil of Cade is often used as an ingredient of liniments and ointments for chronic skin diseases of the scaly and moist types, as eczema, psoriasis, and prurigo, and in parasitic disorders, as favus and various types of ringworm. For favus a soapy embrocation composed of four parts each of alcohol and soft soap and one part of oil of cade is said to be convenient and effectual. The persistent and penetrating odor of oil of cade is a drawback to its use, and the oil should not be employed in acute affections of the skin.

OLEUM CAJUPUTI.

Oil of Cajuput, Oil of Cajeput.

A volatile oil distilled from the leaves and twigs of several varieties of *Melaleuca Leucadendron*, Linné, notably the varieties *Cajeputi*, Roxburgh, and *minor*, Smith (Nat. Ord. Myrtaceæ). The white or broadleaved tea tree of the Moluccas and adjacent islands.

Description.—A light, thin, bluish-green liquid (after rectification colorless or yellowish) having an agreeable and decidedly camphoraceous odor, and a bitterish aromatic taste. With an equal volume of alcohol it forms a clear solution. *Dose*, 1 to 10 drops.

Principal Constituents.—*Cajuputol* (*Cineol* or *Eucalyptol*) ($C_{10}H_{16}O$) (over 65 per cent), a constituent of many oils; *terpineol* and a small quantity of terpenes.

Preparations.—1. *Mistura Cajuputi Composita*, Compound Cajuput Mixture (Hunn's Drops; sometimes called Hunn's Life Drops and Compound Tincture of Cajeput). Contains oils of cajuput, clove, peppermint, and anise, of each 1 fluidounce dissolved in 4 fluidounces of alcohol. A popular antispasmodic during the Cincinnati cholera epidemics of 1849–51. *Dose*, 10 to 60 drops well diluted, or in syrup, mucilage, brandy, or sweetened water. Large and repeated doses will cause gastro-intestinal inflammation.

2. *Linimentum Cajuputi Compositum*, Compound Cajuput Liniment (oils of cajuput, sassafras, and hemlock, aa ℥j; soap, q. s., Fiat linimentum).

Action and Therapy.—The compound liniment of cajuput is a useful stimulant and discutient. It is principally used in mammitis. The compound tincture of cajuput is effective in the relief of pain, as neuralgia, pleurodynia, myalgia, chronic joint inflammations, and in nervous headache. The oil applied to the cavity of a carious tooth sometimes relieves toothache.

Internal. Oil of cajuput may be used for the same purposes as the other aromatic oils, chiefly as a stimulating carminative to relieve intestinal pain, spasmodic colic, and cramps, and to alleviate hiccough, nervous vomiting, and congestive dysmenorrhœa. It is also a good stimulant in the cough of phthisis, and chronic forms of bronchitis and laryngitis.

The Compound Cajuput Mixture is a most valuable agent in cholera morbus, being used by Eclectic practitioners oftener than any other medicine, except in severe cases when the conjoint use of morphine is necessary.

OLEUM CHENOPODII.

Oil of Chenopodium, Oil of American Wormseed.

A volatile oil obtained from *Chenopodium ambrosioides anthelminticum*, Linné (Nat. Ord. Chenopodiaceæ). Naturalized in the United States.

Description.—A colorless or pale-yellowish oil having a penetrating and persistent disagreeable taste and odor. Soluble in alcohol. *Dose*, 1 to 6 drops.

Specific Indications.—Ascarides, hookworm.

Action and Therapy.—One of the most efficient but disagreeable tasting of anthelmintics, being especially useful for the removal of ascarides or roundworms. Two (2) or three (3) drops may be given on sugar, in emulsion, or in capsules two or three times a day before meals, for two to five days, and followed by a brisk cathartic. Intestinal irritation and inflammation is not a bar to its use notwithstanding that it is a stimulant to both the circulation and nervous system. It is said to succeed better than thymol in hookworm (uncinariasis) and, unlike that agent, can be given in association with castor oil, the latter also increasing its efficiency. Oil of chenopodium forms the basis of several popular "worm nostrums". It is also diaphoretic, diuretic, and expectorant.

OLEUM MORRHUÆ.

Cod Liver Oil, Cod Oil, Oleum Jecoris Aselli, Oleum Hepatis Morrhuæ.

A fixed oil obtained from the fresh livers of *Gadus Morrhua*, Linné, and other species of Gadus (Family Gadidæ). The common codfish of the North Atlantic waters.

Description.—A thin, pale-yellow oil having a slightly fishy odor, and a non-rancid, fishy taste. Soluble in chloroform and ether, but very slightly in alcohol. *Dose*, 2 to 8 fluidrachms.

Principal Constituents.—*Olein* (70 per cent), palmitin, and stearin, free fatty acids, *gaduin*, and *morrhuol*, a crystalline substance containing biliary substances, vitamines, and traces of iodine and bromine. Oil from fresh livers does not contain the so-scalled alkaloids of codliver oil, which are cadaveric decomposition products found mostly in the brown oils.

Preparation.—*Emulsum Olei Morrhuæ*, Emulsion of Cod Liver Oil. (Rub 500 parts of Cod Liver Oil with 125 parts of Acacia, in a dry mortar, add 250 parts of Water, and continue the trituration. Now add 100 parts of Syrup and 4 parts of Methyl Salicylate (or Oil of Wintergreen or any desired flavor) with enough water to make 1000 parts.) This is essentially the methods and proportions recommended in the U. S. P.

Specific Indications.—Malnutrition, loss of flesh, poor assimilation, and marasmus.

Action.—Cod liver oil is readily absorbed when rubbed into the skin. When taken internally it is more readily absorbed and more easily assimilated than most oils or fats, and thus contributes to increase the fats and the weight of the body. It is easily oxidized, and is more of a food than a medicine. Nevertheless if it contributes to the body iodine and bromine and phosphorus, it is also of much worth as a medicine. When it agrees with the stomach it unquestionably nourishes the body.

Therapy.—*External.* Applications of cod liver oil may be employed in rhagades, chaps, excoriations and fissures, and in chronic scaly skin diseases. Inunctions of the oil are useful, though disagreeably offensive, in states of general malnutrition, especially marasmus and rickets in children, and tuberculosis and chronic debilitating skin diseases, attended by wasting of tissues.

Internal. Cod liver oil is nutritive and alterative, and is both a food and a medicine in conditions of defective nutrition. When it can be tolerated by the stomach, or the patient, it can be relied upon to give good results. If, however, it provokes nausea and vomiting, disgust or diarrhœa, it is certain to be harmful. As a fat-producing agent it has excelled in digestibility all other fats which have been proposed as substitutes for it. When kindly received and tolerated it increases the quantity of red blood cells, improves the appetite and digestion, adds flesh and strength, gives a fuller and better pulse, and greatly improves nutrition.

Cod liver oil does the most good in wasting diseases and conditions of malnutrition, such as are met in tuberculosis and scrofula, rickets, marasmus, chronic bronchitis, chronic rheumatism, arthritis, and synovitis and osseous caries in strumous subjects. Aside from its value in rickets (usually with phosphorus), in well-selected cases, it seems to distinctly increase resistance to the invasion of respiratory diseases. It is especially valuable, when tolerated, in the pre-tubercular, giving power to resist the tubercular invasion. In chronic joint diseases and in tabes mesenterica, with emaciation, hard abdomen, offensive breath, and cough it is especially desirable. It does not cure, but retards consumption, or at least enables the patient to live longer and with greater comfort. Clearly it is a remedy for impaired

digestion, defective assimilation, and imperfect nutrition. It is frequently advantageous in advanced syphilis and brain disorders with failing nutrition, and sometimes aids in neuralgia by giving strength to the system. Occasionally the emulsions are more acceptable, but as a rule patients learn to prefer the pure oil in small doses. Teaspoonful doses are better than larger ones. The taste may be made tolerable by adding a pinch of salt, or by eating a fragment of smoked herring after taking the oil. Some advise brandy, but this is more likely to finally disorder digestion. Experience has shown that it is unwise to administer oils in milk, coffee, or other common beverages because of the disgust for those necessities so often engendered.

OLEUM OLIVÆ.

Olive Oil, Sweet Oil.

A fixed oil obtained from the ripe fruit of *Olea europæa*, Linné (Nat. Ord. Oleaceæ). The olive tree of Asia and southern Europe; cultivated.

Description.—A pale yellow or light greenish-yellow oil, of slight odor and taste, followed by feebly acrid after-taste. Slightly dissolved by alcohol, but miscible with chloroform and ether. *Dose*, 2 fluidrachms to 2 fluidounces.

Principal Constituents.—*Olein* (72 per cent), palmitin (28 per cent), and *arachin*.

Action.—Emollient and demulcent, nutritive and mildly aperient. Applied to the skin it is protective and softening, and when accompanied by massage is readily absorbed and appropriated by the system. When swallowed it has little effect in the stomach other than that of a lubricant, but is, partly at least, emulsified and saponified upon reaching the intestines. Here it parts with its olein which becomes a part of the general fat of the body, while excessive quantities pass by way of the intestines and the unassimilated absorbed portion, by way of the renal tract. In contact with the conjunctiva olive oil is irritating.

Therapy.—*External.* Sterile olive oil is a good lubricant for sounds, bougies, and catheters. To facilitate the passage of a catheter inject through it into the urethra warm olive oil to distend the passage. Masseuers sometimes employ it in their manipulations of the body, but it is less useful than wool fat or cacao butter. It is the safest oil to drop into the auditory canal to kill live insects and facilitate their removal afterward by syringing with warm water. It deprives the insects of oxygen, thus causing their death. Olive oil is sometimes applied to burns and scalds, but is less valuable than lime liniment (Carron Oil). Applied warm it gives relief from the pain of insect stings and bites. It may be used for anointing bruises and excoriations, and is especially useful to prevent excoriations from acrid discharges. It causes too much smarting, however, to use upon the chafed surfaces of infants. Poured over the surface it mitigates the pain and unites to chemically form a soap in cases of external poisoning by caustic alkalies. It is sometimes comforting in sunburn and other acute forms of dermatitis. Dropped warm into the aural canal it frequently relieves earache, but has no advantage over warm water for this purpose. Injected into the rectum it removes ascarides, and sometimes soothes when so used in dysentery and colitis. It is the most commonly employed softening agent for cutaneous crusts, such as those of eczema, seborrhœa, favus, and psoriasis. Inunctions of olive oil may be used in malnutrition and wasting diseases, but are

far less valuable than cod liver oil for this purpose. It is, however, readily absorbed and thus serves as a food. In the desquamative stage of the eruptive diseases it relieves burning, itching, lowers temperature by quieting the patient, and prevents the dissemination of infective scales. It is particularly useful in scarlet fever. Olive oil is frequently used as the carrier of local anodynes and anæsthetics, as morphine, menthol, camphor, phenol, etc. A warm, olive-oil solution of camphor is a most effective agent in mastitis, both to relieve the tensive pain and to lessen the secretion of milk. It enters largely into the formation of ointments, cerates, liniments, and plasters.

Internal. In doses of one to two ounces olive oil may purge, but it is often uncertain and ineffective as a laxative. When one is inclined to dyspepsia it tends to increase the digestive difficulty. It is commonly given to infants as a laxative in constipation, but while it sometimes relieves it more often disturbs by creating a mild dyspepsia. Pediatricians now generally hold it more harmful than useful in infantile constipation. It may, however, be used by adults exposed to opportunities for lead constipation and in lead poisoning, to prevent absorption of, and overcome the constipating effect of the metal. While of undoubted utility in some cases of cholelithiasis, by indirectly causing a greater increase in the watery constituent of the bile, it is probably of no other value in the gall-stone diathesis. Certainly it does not dissolve the concretions in the gall duct no matter how readily it may affect the solution of cholesterin outside the body. In the intestines it is converted into a soap, and saponaceous particles have been mistaken for expelled gall-stones. Notwithstanding, it is extensively used and advised by physicians to the extent that the laity now consider it the great essential in the treatment of gall-stone disease. The effect of its long-continued use is to derange both the stomach and the bowels. We have seen a persistent diarrhœa follow the prolonged use of the oil.

Olive oil may be given immediately in poisoning by alkalies and other irritant substances. With the first it combines by saponification, and in the latter acts as a demulcent. It should not, however, be given in either phosphorus or cantharides poisoning, as the activity of these substances through oil solution is decidedly increased.

OLEUM RICINI.

Castor Oil.

The fixed oil obtained from the seeds of *Ricinus communis*, Linné (Nat. Ord. Euphorbiaceæ). An East Indian plant; cultivated.

Description.—A pale yellow or nearly colorless viscid oil, having a faint odor, and a bland, somewhat acrid, and nauseating taste. *Dose*, 2 to 8 fluidrachms.

Principal Constituents.—The glyceride of *ricinoleic acid* (*ricinolein*), fixed oils, and the non-purgative *ricinine*.

Specific Indications.—Pain and irritation in the intestines from irritating or undigested food; intestinal, subacute inflammation, with colic, and watery or mucoid passages.

Action.—Applied externally castor oil is non-irritating, protective, and somewhat emollient. When swallowed it does not irritate the stomach, and the nausea induced is probably due to the odor and the persistence of

the unpleasant clinging contact of the oil in the mouth. Upon entering the small intestines it is split by the pancreatic juice into glycerin and ricinoleic acid, and the latter induces the purgative action. Rubbed into the abdomen castor oil will also cause purgation. After the first hardened feces are removed the stools become liquid and are passed without pain or tenesmus. Castor oil seeds are poisonous, twenty having killed a child.

Therapy.—*External.* Castor oil is protective and slightly stimulating to denuded surfaces, and may be dropped into the eye after burns have caused an ocular ulcer. Equal parts of castor oil and balsam of Peru have been used successfully upon old, sluggish ulcers, as of the shins, and in the treatment of hypergranulation following pus infection after abdominal operations; also in healing the ulcers from burns, wounds, and abscesses.

Internal. Castor oil is one of the mildest and most satisfactory cathartics, and with the exception of sulphate of magnesium is the most commonly employed purgative. It has no irritant effect upon the stomach and operates usually in four or five hours. It is probably the best laxative for children to cleanse the intestinal tract of tainted or undigested food, poorly masticated nuts, and mucoid accumulations. It is very effective in dysentery to prepare the way for more specific medicines, especially when there is evident constipation of the upper bowel. It may prove the best agent where hardened feces are the cause of a mucoid diarrhœa. The best preliminary treatment of entero-colitis in children is a purge of castor oil, after which indicated remedies have a much better opportunity to act. Owing to its thorough yet mild and unirritating character it is the most suitable laxative for constipation of children and for pregnant women before and after labor, before and after abdominal and pelvic operations, and when inflamed hemorrhoids are present. After its use in irritative diarrhœa no other agent will be needed, for the provocative cause having been removed, the natural tendency of the oil is to cause constipation. Castor oil is not a good remedy for chronic constipation, for it cannot be used for prolonged periods without detriment to the patient, and probably an aggravation of the costive condition. But for an occasional purge in constipation preliminary to the use of cascara and other better laxatives for continued use nothing is better than a free dose of castor oil. In cases where there is a semipasty and tenacious light-colored stool with burning at voiding and persisting for weeks, and there is much semi-colicky uneasiness or soreness in the bowels and frequent desire to defecate, castor oil is the best purge that can be used. A single dose usually rectifies the trouble. Castor oil may be used even in inflammatory and febrile conditions.

Castor oil may be employed to assist in the expulsion of worms, giving it before and after vermifuges and tæniacides. It should not, however, be given if aspidium (male fern) has been used, for it increases the poisonous absorption of the latter.

The great drawback to castor oil is its nauseous taste, which may be more or less disguised by peppermint and other aromatics. Peppermint lozenges may be eaten immediately before and after swallowing it; it has been advised in coffee, sweet cider, ale, milk, and broth, but we do not favor the giving of nauseous medicines in common beverages and foods, lest a disgust for the latter be engendered. The following is the best method we

know of for administering castor oil: Squeeze into a suitable warmed glass a small quantity of orange juice, and thoroughly rinse the inner surface of the glass with it. Place the dose of oil upon the juice and cover with more juice. Then having moistened the mouth completely with a portion of the orange juice quickly swallow the mixture within the glass. If this is well carried out the oil will not adhere to the mucosa nor will it be tasted. When a strong purgative is needed, equal parts of aromatic syrup of rhubarb (or neutralizing cordial or glyconda) and castor oil may be given in doses of one to two fluidounces.

OLEUM SANTALI.

Oil of Santal, Oil of Santal Wood, East Indian Oil of Santal, Oil of Sandalwood.

A volatile oil distilled from the wood of *Santalum album*, Linné (Nat. Ord. Santalaceæ). A small tree of southern India and the Indian Archipelago.

Description.—A pale yellow, thickish, oily liquid having the taste and odor characteristic of sandalwood; soluble in alcohol. *Dose*, 1 to 15 drops.

Principal Constituent.—An alcohol *santalol* ($C_{15}H_{26}O$).

Action and Therapy.—Oil of santal closely duplicates the effects of oil of copaiba and oil of cubeb, and will sometimes cause gastro-intestinal disturbances. It is, however, less irritant and pleasanter to take than those oils. It may occasion a red papular eruption upon the skin and the conjunctivæ. Oil of santal is eliminated chiefly by the urinary and bronchial tracts, acting upon them as a stimulant and disinfectant. It is chiefly used in gonorrhœa after the active stage has passed. Occasionally it is employed in chronic bronchitis and bronchial catarrh with fetid expectoration, in pyelitis, chronic cystitis, chronic mucous diarrhœa, and in urethral hemorrhage.

OLEUM TEREBINTHINÆ.

Oil of Turpentine, Spirit of Turpentine, Turpentine Oil.

A volatile oil distilled with water from the concrete oleoresin derived from *Pinus palustris*, Miller, and other species of *Pinus*. (Nat. Ord. Pinaceæ.) United States and Europe.

Description.—A thin colorless liquid having a characteristic taste and odor, becoming more intense with age and by exposure. Soluble in alcohol and glacial acetic acid. It readily dissolves resins, wax, sulphur, iodine, and phosphorus.

Principal Constituents.—A mixture of several terpenes each having the formula $C_{10}H_{16}$. Among them are pinene, phellandrene, camphene, dipentene, and limonene; some sesquiterpenes and the fragrant ester bornyl acetate (borneol). American oil of turpentine contains principally dextro-pinene (australene), while French oil of turpentine is chiefly lævo-pinene (terebentene). Oil of turpentine emulsifies with mucilage 2 parts and water 16 parts, by thorough trituration.

Preparation.—*Linimentum Terebinthinæ*, Turpentine Liniment. Prepared by melting and mixing together 350 parts of oil of turpentine and 650 parts of rosin cerate.

Action and Therapy.—*External.* Oil of turpentine may be used for most of the purposes named under Rectified Oil of Turpentine. However, the latter is the least likely to cause unpleasant effects.

Internal. This preparation should not be used internally; only when rectified is it fit for internal medication. (See *Oleum Terebinthinæ Rectificatum.*)

OLEUM TEREBINTHINÆ RECTIFICATUM.

Rectified Oil of Turpentine, Rectified Turpentine Oil.

Description.—A thin colorless liquid corresponding to the properties described under *Oleum Terebinthinæ*, which see. *Dose*, 1 to 20 drops. (*Usual dose*, 5 drops.)

Preparation.—*Emulsum Olei Terebinthinæ*, Emulsion of Oil of Turpentine. *Dose*, 1/2 to 2 fluidrachms.

Specific Indications.—*Internal.* Dry, deep red, glazed and cracked tongue, with sordes, muttering delirium, rapid feeble pulse, repressed secretions, tympanites and hemorrhage; relaxed and enfeebled mucosa with excessive catarrhal discharges.

External. Pain and meteorism.

Action and Toxicology.—Oil of turpentine is rapidly absorbed by the skin, which it irritates and reddens, and if long in contact, may produce vesication or ulceration. These untoward effects are more apt to occur if the oil be applied hot or with friction. Applied to the skin it imparts warmth and dilates the peripheral vessels. Upon the mucous tissues its warmth is more intense and may amount to smarting pain and produce congestion. Swallowed it imparts the same glowing warmth from mouth to stomach, excites secretion, checks flatulence, induces peristalsis, and if the amount be large, provokes diarrhœa. Its ingestion causes the skin to feel hot, the circulation is slightly accelerated and arterial tension increased. Being quickly absorbed it appears in the urine almost immediately after being swallowed or inhaled, imparting to that excretion the characteristic odor of violets. The vapor is irritating to the breathing passages, and, as also when taken, induces a sense of intoxication and dizziness. The secretion of the kidneys is increased, and prolonged use or overdoses may cause irritation, and inflammation of those organs, and hematuria. Poisonous amounts cause bloody urine, severe strangury, priapism, intolerable aching in the loins, acute nephritis, cyanosis, dilated pupils, gastro-enteritis, and collapse. Some individuals are very susceptible to the effects of turpentine, and, in a few, vesicular or papular rashes of an eczematous type have occurred.

Therapy.—*External.* Turpentine is rubefacient and counter-irritant and to some degree antiseptic and hemostatic. Locally applied it is valuable to assist in relieving deep-seated and other inflammations, as in pleurisy, pneumonia, bronchitis, laryngitis, pharyngitis, peritonitis, arthritis, and other congestive and inflammatory disorders; and to alleviate pain in sciatica, myalgia, pleurodynia, and various neuralgias. For these purposes equal parts or one-fourth part of turpentine may be mixed with hot lard or olive or cotton-seed oil, and applied by hand, with or without friction, as desired. It must be borne in mind that friction intensifies the local effect of the oil. A more effectual method is to apply a flannel cloth wrung from hot water and upon which has been sprinkled a few drops of turpentine. Another but more complicated procedure of preparing a "turpentine stupe" is to wring a flannel out of very hot water by twisting it in a towel until it ceases to drip. Then dip the cloth in turpentine which has been heated in a tin container immersed in another vessel of very hot water and wring out all excess of the oil. (*Caution:* Turpentine must not be heated on a stove or over a flame; it is highly inflammable.) Turpentine stupes are to be applied as hot as can be borne, and as soon as any discomfort

or pain is felt are to be immediately removed, lest blistering occur. Turpentine, applied full strength, or diluted with a bland oil, may be used to relieve chilblains and bunions and to stimulate repair in sluggish ulcers and bed sores. Combined with linseed oil it has been advised for small burns and scalds, but as this method is painful and absorption great it is not to be commended. Liniments containing turpentine may give relief to inflamed joints in acute articular rheumatism, swollen and inflamed glands, and are popular in domestic practice for the relief of temporary lameness and muscular soreness. It is of great service locally, together with its internal use, to prevent and control meteorism in typhoid fever and puerperal peritonitis. In all inflammations with tense skin great care must be taken not to cause blistering by it. The vapor of turpentine is said to be fatal to the itch mite; and the oil vaporized from hot water gives relief in croup and chronic bronchitis. It may be used as an adjunct to treatment in diphtheria for its antiseptic and stimulant properties, and particularly in the membranous form of laryngeal diphtheria, in which it contributes in some measure to the loosening and expulsion of the membrane.

Internal. For internal use only the rectified oil of turpentine should be used. Turpentine is employed as a diffusible stimulant, antiseptic, and antihemorrhagic. It is also an anthelmintic and tæniafuge. Very small doses are stomachic, and as a warming carminative it is useful to relieve intestinal flatulence. Turpentine has a twofold action, which is important. It stimulates to normal secretory activity when there is a lack of intestinal secretion due to a semi-paretic state of the alimentary canal; and it restrains excessive secretion when due to lack of tone. It is always a remedy for atony and debility; never for active and plethoric conditions. In typhoid or enteric fever it is the best remedy known to prevent tympany and ulceration. It is indicated when the tongue is dark red, glazed, or brown-coated, hard, dry, and cracked, and there are sordes upon it, as well as upon the teeth. In this stage ulceration is active, hemorrhage impending or present, temperature high, pulse small, wiry and rapid, the mind wanders, and the urine is scanty, concentrated, and very dark. In this state there is marked depression of innervation, putrefactive gases are formed, hemorrhage imminent, prostration is great, mentality disordered, and the patient is at a very low ebb. When this condition prevails no other medicine offers such hope of relief as turpentine. From five to ten minims may be given in emulsion every two or three hours. In tardy convalescence from enteric fever, when ulcers of Peyer's glands stubbornly refuse to heal and diarrhœa continues or frequently recurs, and hemorrhage still threatens, turpentine may be given to stimulate repair and will do as much as any medicine can to hasten recovery. When hemorrhage does occur during the progress of the fever, turpentine by its hemostatic action assists in controlling manageable cases. The external use of the drug (see above) should accompany its internal administration.

Turpentine is of value in other hemorrhages of the gastro-intestinal tract—notably that accompanying ulceration of any part of the small intestines, with flatulent distention. It frequently renders good service in the hemorrhage of gastric and duodenal ulcer; and it may succeed in some cases of hematuria and menorrhagia. As these cases are seldom or never hemor-

rhages of plethora, but are of the passive variety that occurs in the weak and anemic subject with a disposition to tissue dissolution and relaxed blood vessels, turpentine is clearly indicated and its record justifies its claim to efficiency. Turpentine is also one of the few drugs that have been effectual in hemorrhagic transudation into the skin and mucosa, as in purpura and scurvy, and it has a limited usefulness in hæmophilia.

In renal disorders turpentine is generally contraindicated; certainly so in irritation and inflammation. It may, however, be used when a deficient secretion of urine depends wholly upon general debility; and in chronic disorders, when active inflammation has long passed, and in chronic nephritis, where active inflammation is seldom present, it may be necessary to employ a powerful stimulating diuretic. Turpentine may best serve the purpose. It must be remembered, however, that in all kidney disorders there is the ever-confronting danger of provoking suppression of the urine. Turpentine has been advised in pyelitis, pyo-nephritis, and hydro-nephritis, both for its stimulating and pus-limiting antiseptic effect. It is of more certain service in chronic cystitis and gleet, both with excessive mucous discharge.

As an anthelmintic and tænicide such large doses of turpentine are required as to render such use inadvisable; and its local employment for ascarides is too painful and less desirable in every way than weak salt solutions or infusion of quassia.

Old oxidized oil of turpentine and French oil of turpentine are reputed antidotes in phosphorus poisoning.

OLEUM THEOBROMATIS.

Cacao Butter, Oil of Theobroma, Butter of Cacao.

A concrete fixed oil expressed from the roasted seeds of *Theobroma Cacao*, Linné (Nat. Ord. Sterculiaceæ), South America.

Description.—A yellowish-white, solid oil having a bland taste suggestive of chocolate, and a slight but agreeable odor. Slightly soluble in alcohol, readily in boiling dehydrated alcohol, and freely in ether or chloroform. It is composed chiefly of the glycerides, stearin and olein, with small quantities of laurin, palmitin, and arachin; and slight amounts of formic, acetic, and butyric acid compounds. The alkaloid *Theobromine* ($C_7H_8O_2N_4$) is sometimes present.

Action and Therapy.—*External.* Cacao butter is emollient, and inasmuch as it does not readily turn rancid may be used for the protection of abraded or excoriated surfaces, and by inunction massage to improve the general nutrition of feeble infants and invalids. Owing to its melting at the temperature of the body it is an admirable base for suppositories for applying local medication in rectal, vaginal and uterine disorders.

OLEUM TIGLII.

Croton Oil.

A fixed oil expressed from the seeds of *Croton Tiglium*, Linné (Nat. Ord. Euphorbiaceæ). East Indies and Molucca and Philippine Islands; cultivated in Europe and China.

Description.—A pale yellow or brown-yellow, somewhat viscid oily liquid, slightly fluorescent and having a feeble but characteristic odor. It should not be tasted, and must be handled with extreme care for it causes a papular eruption. Soluble freely in oils, ether, and chloroform, and slightly (more readily if old) in alcohol. *Dose*, 1 drop.

Principal Constituents.—Many (9 at least) glycerides of volatile acids, of which *crotonoleic acid* ($C_5H_8O_2$) is the chief; fatty acids free and combined; a non-purgative but vesicant resin, *crotonol* ($C_{18}H_{28}O_4$).

Action and Toxicology.—Croton oil is a violent irritant causing erythematous redness, intense burning pain, and an eruption of small vesicles which readily become pustular. Edematous inflammation may follow. Owing to umbilication of some of the vesicles the eruption may be mistaken for that of small-pox, but there is considerable variation in size, thus distinguishing them from that disease. Internally a single drop will quickly cause purgation. Even its external use has been followed by catharsis. An overdose produces marked gastro-intestinal inflammation accompanied by pain, griping, vomiting, and hydragogue catharsis, bloody stools, and death. Usually the vomiting prevents a fatal issue. In poisoning by it free emesis should be provoked, and opiates should be given for the pain and to restrain purgation, and demulcents to control the irritability of the mucosa. In case collapse threatens, external heat should be applied and heart stimulants be given subcutaneously.

Therapy.—*External.* Croton oil is now seldom used externally, and its reckless use by the profession of years ago was one of the causes that led to the opposition which resulted in the formation of the Eclectic school in medicine.

Internal. Croton oil is remarkable as a rapidly acting and certain drastic cathartic, reserved chiefly as an emergency remedy when other cathartics fail. The smallness of the dose (one to two drops in bread) and its prompt and thorough effects make it the most useful purgative for the insane and the unconscious (place a drop far back upon the tongue), and as a revulsive in cerebral congestion and apoplexy, to lower intracranial blood pressure through dilation of the vessels of the bowels. It is the most efficient purgative in lead colic with obstipation, obstinate constipation when no inflammation is present, fecal impaction without intestinal obstruction, and in comatose states as a revulsive. It may be used in puerperal eclampsia and in uremia for its derivative effects. Croton oil usually acts upon the bowels in less than an hour and occasions much borborygmus. As a rule it does not greatly debilitate the patient. It is not a good cathartic in dropsical conditions because it cannot be repeatedly administered without harm. Neither should it be used, if possible to avoid it, in children and the feeble and pregnant, nor where hemorrhoids, intestinal or renal inflammation, or peritonitis are present.

OPIUM.

Opium.

The milky exudate, air dried, obtained by incising unripe capsules of the growing plant *Papaveris somniferum*, Linné; and its variety, *album*, De Candolle (Nat. Ord. Papaveraceæ). Asia Minor chiefly; also some other parts of Asia, Europe, and Africa. Cultivated.

Description.—Rounded, flattened, grayish-brown masses, showing a dark-brown, lighter-streaked interior, and having a somewhat nauseous bitter taste, and a peculiar narcotic odor. When fresh it is more or less plastic; when kept it becomes hard and brittle. Opium masses are of variable sizes and usually coated with adherent poppy leaves, and often with the fruits of a species of Rumex used in packing for transportation. The U. S. P. requires that normal, moist opium should contain not less than 9.5 per cent of anhydrous morphine. *Dose*, 1/4 to 2 grains. (*Average dose*, 1 grain.)

Principal Constituents.—Opium contains nineteen or twenty alkaloids, some of which are combined with meconic acid, forming meconates, some with sulphuric acid, some free, as narcotine, a weak base. Those of medicinal interest are: (1) *Morphine* ($C_{17}H_{19}NO_3.H_2O$), anodyne and narcotic (see *Morphina*); (2) *Codeine* ($C_{18}H_{21}NO_3.H_2O$), (see *Codeina*); (3) *Narcotine* (Anarcotine) ($C_{22}H_{23}NO_7$); (4) *Narceine* ($C_{23}H_{29}NO_9$); *Thebaine* ($C_{19}H_{21}N_3O$) Papaverine ($C_{20}H_{21}NO_4$); and Pseudo-morphine ($C_{34}H_{36}N_2O_6$).

Other alkaloids are: rhœadine, cryptopine, codamine, laudanine, lanthopine, meconidine, protopine, hydrocotarnine, laudanosine, oxynarcotine, gnoscopine, tritopine, and xantholine. Besides these are the non-alkaloidal constituents: meconic acid, meconin, meconoisin, opionin; volatile oil and other common plant constituents and inorganic salts.

Preparations.—1. *Opii Pulvis*, Powdered Opium. A fine light-brown powder. Should contain 1/2 per cent more, but not more than 1 per cent more, of anhydrous morphine than opium (see page 500). The U. S. P. permits the reduction of morphine content higher than indicated by the use of any inert diluent. *Dose*, 1/4 to 2 grains (average, 1 grain).

2. *Opium Deodoratum*, Deodorized Opium. Should be of same morphine strength as Opii Pulvis (see above). *Dose*, 1/4 to 2 grains (average, 1 grain).

3. *Opium Granulatum*, Granulated Opium. Same morphine content as Opii Pulvis (see above). Used in the preparation of tincture of opium and deodorized tincture of opium. *Dose*, 1/4 to 2 grains (average, 1 grain).

4. *Pulvis Ipecacuanhæ et Opii*, Powder of Ipecac and Opium (Compound Powder of Ipecac, Dover's Powder). A grayish-white or pale-brown powder containing 10 per cent each of opium and ipecac. (Ten (10) grains represent 1 grain of opium or about 1/8 grain of morphine.) *Dose*, 1 to 20 grains.

5. *Pulvis Ipecacuanhæ et Opii Compositus*, Compound Powder of Ipecacuanha and Opium (Diaphoretic Powder, Beach's Diaphoretic Powder). (Contains Opium (10), Camphor (40), Ipecac (20), Bitartrate of Potassium (160). (Each ounce of this powder contains 19 grains of Opium. Each ten (10) grains, therefore, represents nearly 1/2 grain of opium (accurately, 11 1/2 grains contain 1/2 grain of opium), 2 grains of camphor, 1 grain of ipecac.) *Dose*, 2 to 10 grains.

6. *Tinctura Opii*, Tincture of Opium (Laudanum). Contains 10 per cent of opium, almost the equivalent of 1 per cent of morphine. (Therefore 10 minims equal about 1 grain of opium, or approximately 1/8 grain of morphine.) *Dose*, 1 to 30 minims. (The large amounts should never be used as initial doses.)

7. *Tinctura Opii Deodorati*, Deodorized Tincture of Opium. Same strength as Tincture of Opium. *Dose*, 1 to 30 minims. (The large doses should never be used as an initial dose.)

8. *Tinctura Opii Camphorata*, Camphorated Tincture of Opium (Paregoric). About 4/100 per cent opium. Paregoric is about 20 times *weaker* than Laudanum (Tincture of Opium) as it contains about 1/4 grain of opium in each fluidrachm. This is practically equivalent to 1/40 grain of morphine. *Dose:* For infants, 5, 10, to 20 minims; for adults, 1 to 4 fluidrachms.

CHIEF OPIUM ALKALOIDS AND THEIR SALTS.

Morphina, Morphine. Permanent colorless or white fine needles or crystalline powder, without odor and very sparingly soluble in most ordinary solvents. *Dose*, 1/12 to 1/4 grain (average, 1/8 grain).

Morphinæ Hydrochloridum, Morphine Hydrochloride (Morphine Chloride). Permanent and odorless silky needles, or cubical masses or crystalline white powder, readily soluble in hot or cold water; soluble also in glycerin. Not soluble in chloroform or ether. *Dose*, 1/12 to 1/4 grain (average dose, 1/8 grain).

Morphinæ Sulphas, Morphine Sulphate. Permanent and odorless, white, silky and feathery needle crystals, freely soluble in hot or cold water; not soluble in chloroform or ether *Dose*, 1/12 to 1/4 grain (average dose, 1/8 grain).

Codeina, *Codeinæ Phosphas*, and *Codeinæ Sulphas*, see under respective heads.

Specific Indications.—*Opium and Morphine Salts.* Pulse soft and open, or when waves are short, and it gives a sensation of fullness and always lacking hardness, skin soft, tongue moist, face pale, eyes dull and expressionless and immobile or dilated; permanent glycosuria with prostration of powers; pain in incurable diseases.

Morphine Salts. (In addition to above.) Unbearable pain; pulmonary hemorrhage; gall-stone and renal colics; pain, with spasm; pain and shock from accidents or acute poisoning; angina pectoris; to prevent shock from surgical operations; in obstetrics to relax and quiet nervous apprehension (use with discrimination).

Action.—The dominant action of opium is due chiefly to its contained morphine and is spent upon the cerebro-spinal tract, quieting the functions of the cerebrum and exciting those of the spinal cord. In man the most profound effect is upon the cerebrum; in animals upon the cord. Upon

the brain, if the dose be small, the first effect is a temporary excitation followed by depression resulting in sleep; if the dose be large the stage of excitation may be absent. When absorbed the drug is a depressant to the sensory filaments, benumbing them against pain, and finally the motor nerves come under its depressing power. While the exact cause of its pain-relieving properties is not definitely known, it is believed to be due to its depressive effect upon the cerebral perceptive centers and upon the conducting paths of the cord.

Through whatever channel opium or its alkaloid, morphine, is introduced into the body—by stomach, subcutaneously, or intravenously, by rectum, or a wound or abrasion, its chief and dominant effect is upon the higher cerebral centers finally producing depression. Upon the unbroken skin it probably has no action; but when applied to mucous surfaces it is readily absorbed. Children and old persons are profoundly affected by the drug, and women, as a rule, are more susceptible than men. Nursing children may become narcotized by the milk of a mother who takes opium, and infants have been known to die within a day or two after birth when deprived of the effects of the drug as acquired in intra-uterine life.

In small doses opium does not appreciably affect the circulation. Full doses, however, stimulate the vagi, both centrally and peripherally, causing a slow action of the heart, the force of which is also increased by direct stimulation of the heart-muscle and the intracardiac ganglia. To the increased heart action is due the rise in blood pressure. Toxic doses paralyze both the pneumogastrics and the heart, the pulse then becoming excessively rapid and weak.

The effect of morphine upon the respiration is very important, and therein lies its danger as a lethal agent. In very small doses it is said to stimulate respiration, but large doses powerfully depress breathing, and in fatal opium poisoning death is usually due to asphyxia through centric respiratory paralysis.

Morphine causes profound myosis when given in full doses. This is due to stimulation of the oculo-motor centers. Usually just preceding death paralysis of these centers results in dilation of the pupils.

Opium diminishes all the secretions except that of the sweat. That normal diaphoresis remains unabated or is increased is probably due to dilation of the blood vessels of the skin. Opium causes retention, rather than suppression, of the urine, though the secretion of the urine is thought to be somewhat inhibited by the drug. Opium very pronouncedly checks the secretions of the intestines and arrests peristalsis, chiefly by stimulation of the splanchnic inhibitory nervous apparatus. The result is constipation. On the other hand toxic doses may paralyze the inhibition and thus stimulate peristalsis.

Opium moderately elevates temperature unless the dose be toxic. In that event the body-heat is reduced. Opium limits tissue-waste by decreasing the output of urea and other nitrogenous detritus.

Probably most of the morphine ingested is oxidized in the body; that which is eliminated, partly as morphine, is voided by way of the stomach and kidneys. Morphine is rapidly eliminated into the stomach

when a poisonous dose is taken, so that it is well to bear this fact in mind and prevent its reabsorption by frequently washing out that organ.

Very small doses of morphine, or its equivalent of opium, induce a primary stimulation or excitation which may or may not be followed by a sedative effect. Medium doses augment the size and slow the velocity of the pulse, increase cutaneous heat, render the mind active, and produce a general sedative effect upon the whole body. The higher brain centers are profoundly impressed, the intellectual faculties becoming sharper, ideas more brilliant, precise, and under control, the power of application more intense, and the conversational propensities stimulated. The imaginative and creative faculties are, if anything, exaggerated, while judgment, steadiness and co-ordinate thought and reasoning seem to be more in abeyance than usual. If the dose be small this stage is never passed. Under large or full doses, however, this state of excitation and well-being abates, leaving a calm, careless, indifferent, and pleasurable sensation, with a series of fleeting ideas, succeeded, after a longer or shorter interval, by a dream-filled sleep which may last for several hours. Upon awakening the patient may complain of dizziness and nausea, trembling, headache, and loss of appetite. Most of the secretions will have become more or less suspended and constipation induced, though the sweat glands will retain their activity. From this state the patient awakens when the drug has spent its force, and if the drug be not repeatedly resorted to no harm will have been done. If there is pain the patient will have lost all sensibility to it while under the influence of the drug, for morphine is the most perfect analgesic known. If the dose be large the sleep from morphine may be dreamless.

Toxicology.—When a toxic dose of morphine or opium has been taken there occur symptoms which may be grouped under three stages:

The first, or stage of excitation, may be absent; or if present, be of very short duration.

In the second stage, depression speedily comes on with a full and slow pulse, suspension of the cerebral functions, overpowering drowsiness followed by a deep sleep with slow and stertorous breathing, suffused, flushed or cyanotic countenance, strongly contracted pupils, warm dry skin, and muscular prostration. The patient may be aroused by shaking, flagellation, or loud shouting, but as soon as undisturbed sinks again into a deep slumber. If he is not kept awake and breathing stimulated, he passes almost imperceptibly into the final or lethal stage.

In the third or lethal stage coma is absolutely complete. The face, at first turgid or livid, becomes pale and the lips livid, the extremities are cold, the pupils minutely contracted (pin-point myosis), the dry skin gives way to the sweat of death, the breathing becomes progressively slower and slower, shallow and labored, until it finally ends in a soft or almost imperceptible respiration. Death then takes place from respiratory paralysis or asphyxia, though the heart stops almost immediately after breathing ceases.

The treatment of acute opium poisoning must be prompt and unremitting. Owing to the fact that the vomiting centers and the peripheral nerves of the stomach are depressed by toxic doses of opium, emetics do

not act well. They should be tried, however, as well as other means of inducing vomiting, as tickling the throat, etc., but should not be relied upon. Washing out the stomach by lavage is to be preferred, and should be repeated at short intervals because morphine is readily eliminated from the blood-current into the stomach, and continuation of the poisoning may be maintained through its reabsorption. In the meantime a solution of potassium permanganate (3 to 5 grains in a half pint of water) should be given to destroy the morphine, and strong black coffee administered freely by mouth and by rectum. Tannic acid only imperfectly precipitates the morphine, and some of its salts not at all. The all-important necessity is to keep the patient breathing, as depression of respiration is the most dangerous feature of opium poisoning. For this purpose strychnine sulphate (1/30 to 1/10 grain) preferably, or atropine or cocaine is to be used. Ammonia or alcohol may be needed to support both the heart and respiration. While death probably does not take place because of the deep sleep or narcosis, it is absolutely necessary to keep the patient awake in order to have his co-operation and voluntary effort to keep up breathing, and thus fight the depression of the respiratory centers. The patient should be walked between two attendants constantly, and flagellated with hot and cold wet towels, or switches, artificial respiration performed or the faradic current applied to the skin. In all of these efforts, however, human limitations must be considered, and there is no necessity for bruising or lacerating the flesh, or pushing annoyance to exhaustion of the patient. The latter only favors deeper narcosis, and if the patient goes to sleep his voluntary efforts to breathe by sheer will power are lost and death is the penalty. To prevent reabsorption of the drug from the urine, catherization should be resorted to several times.

Therapy.—*External.* Notwithstanding the fact that opium and its alkaloids in watery solutions are probably not absorbed by the skin, and therefore do not impress the peripheral cutaneous nerves, lead and opium wash (Tinctura Opii, Liquor Plumbi Subacetatis aa, fl℥ij; Aquæ, q. s. Oj) is a common application intended to subdue pain and act as a local sedative in contusions, sprains, bruises, articular inflammations, and in erysipelas and other local inflammations. For this purpose it has never attained popularity among Eclectic practitioners. This practice has been well expressed by Wilcox as "simply a concession to popular sentiment".

Upon mucous structures, however, the anodyne effects of opium are more perfect. In suppository or ointment opium is often included to relieve pain in hemorrhoids and anal fissures and to check reflex vomiting. Sometimes solutions of morphine are used in painful ophthalmias and as an injection for gonorrhœa. It has nothing to commend it for either purpose, and its use in this manner is not wholly unattended by danger.

Internal. The therapeutic virtues of opium are due chiefly to morphine and but little to the associated alkaloids, excepting codeine. To the narcotine is due the occasional tetanic action of the drug. The uses given below, therefore, will apply to both morphine (chiefly) and opium (where a slower effect is desired), and to the latter when specifically stated.

The therapeutic uses may be conveniently grouped under the following necessities: (1) To relieve pain and distress; (2) to allay peripheral

irritation and inflammation; (3) to restrain excessive or hyper-secretion; (4) to control spasm and convulsions; (5) to stop hemorrhage; (6) to produce sleep; (7) to cause diaphoresis; (8) to maintain strength under systemic strain and to favor metabolic functioning.

While both opium and morphine may be used arbitrarily for the relief of severe pain, they should for most other purposes, and even for pain, when possible, be employed with due regard for their specific indications. To prescribe them intelligently it should be remembered that "the patient with the *hard*, small pulse, the dry tongue, dry contracted skin, the flushed face, bright eye, and contracted pupil, is always injured, temporarily at least, by the administration of opium. On the contrary, the patient will be benefited when the pulse is *soft* and open, or when small the waves are short, and it gives a sensation of fullness and always lacking hardness, the skin is soft, the tongue moist, the face pale, and the eyes dull, expressionless, immobile, and dilated." Under these conditions pain and spasm are much more readily controlled and the so-called effects of idiosyncrasy are minimized. While nearly always pain yields to morphine and its use may be absolutely imperative, it yields much better and kindlier and to smaller doses when the indications as given are present, and with less general harm to the patient. For other uses than for the relief of pain, as far as possible one should be governed by the established specific indications. As the chief therapeutic value of opium resides in morphine, the alkaloid will be preferred except where opium or one of its combinations is designated.

Morphine (usually administered in the form of the sulphate) is the best and most certain remedy for *pain*. As such, however, it should be reserved for emergency uses and not be prescribed for slight and ill-defined conditions, for persistent, protracted, or oft-recurring neuralgias, for ordinary menstrual distress, or for long-continued pain from any cause or of any character, except in incurable diseases. In most painful states, except excruciating paroxysmal pain, other agents should be used if possible, and morphine only as last resort. In neuralgias, with the possible exception of sciatic neuralgia and tic douloureux, other drugs, such as aconite, gelsemium, rhus, arsenic, acetanilid or phenacetin are far preferable, not because they are equally as analgesic, but because they do not engender a pernicious habit—a condition sure to be established when morphine is given for more than a very brief time for a temporary purpose.

For *pain with spasm* morphine is the most certain and most effectual remedy known. It is absolutely imperative for the relief of severe gall stone or renal colics. Not only does it relieve the excruciating suffering, but it relaxes the gall duct and the ureters, so that the concretions, if at all voidable, may be more readily passed. As a rule, such concretions as give rise to spasmodic pain are voidable, else they would not be small enough to engage in the passages, and the paroxysmal pain, shifting in position, is a fair indication that they are passing. During these ordeals the patient should be kept under the full influence of the drug, one-fourth to one-half grain of morphine sulphate being given hypodermatically, and repeated as needed, until the distress has abated. Patients suffering from severe pain stand opiates in doses that would prove disastrous under other conditions; still

the doses should not be so closely plied that an overdose is duplicated near the termination of the passage of such concretions; the latter usually passing in from thirty-six to forty-eight hours.

Morphine may be used to relieve the pain and quiet nervous agitation and relax muscular contraction in fractures, lead colic, and the crises of locomotor ataxia. In angina pectoris it is probably the most useful remedy. While contraindicated in ordinary congestion and inflammation of the brain and meninges, it may prove the only agent that will give relief from the intense pain of acute simple meningitis (early stage before effusion) and in cerebro-spinal meningitis or "spotted fever". It is sometimes necessary in acute peritonitis, especially when traumatic, where the pain is intolerable and bowel movements aggravate, and in acute appendicitis, when nothing else will relieve. After an undoubted diagnosis has been made and a case is to be operated upon, morphine is permissible to quiet the pain, relax rigidity, prevent shock, and allay the agitation and apprehensiveness of the patient. It should not, however, be used too early or, if possible, in the first attack of acute catarrhal appendicitis to the extent that the symptoms may be so obscured as to mislead the patient and the physician as to the true condition of the disease. If other expedients can be employed morphine should be withheld, as far as possible, in appendiceal inflammations.

In very severe gastralgia morphine with bismuth gives prompt relief, but should not be repeatedly used in oft-recurring attacks. It is sometimes demanded in ulcer of the stomach, especially if hemorrhage occurs. In cancer of the stomach, or any other organ of the body, it is a most merciful drug, and there should be no compunction concerning its use after an unquestioned diagnosis has been made by every means of precision possible, including radiography.

Morphine is to be employed as necessity dictates, to alleviate the pain from irritant poisons, and of severe burns and scalds, both external and internal.

Morphine is frequently employed preceding the use of anæsthetics, especially chloroform, to increase their efficiency, allow lesser dosage, and to prevent shock. More recently the tendency has been to discourage this use of the drug on account of the shallow breathing induced by it, thus retarding the prompt induction of proper anæsthesia. After operations small doses may be given to produce rest, quiet pain and agitation, and to prevent shock and irritative febrile reaction. Frequently codeine serves the purpose better than morphine and is less restraining to the secretions. It is the custom with many obstetricians to inject one-eighth grain of morphine during the severer periods of the ordeal of parturition. It gives rest, relaxes a rigid os, and stimulates normal contractions; besides it gives comfort and assurance to the woman, and many contend that it in no way harms either the mother or the child. Personally, however, we believe that it often narcotizes the child and results in a deeply cyanosed state and stupor from which it is difficult to resuscitate the child. Many of these cases are attributed to imperfect anatomic evolution of the circulatory tract (blue babies), when in fact they are morphinized babies.

Opium and morphine induce sleep in insomnia from almost any cause; but they should not be so employed except where sleeplessness is due to

pain. Other forms of insomnia yield to safer hypnotics. It may, however, be needed in the insomnia of acute melancholia, and in that accompanying distressing incurable heart-disease, with pain and dyspnœa, and in the sleeplessness of phthisis and cancer. If excitement is great in maniacal conditions with insomnia, morphine alone may aggravate, and chloral will act better. Sometimes a small dose of the former may be combined with a less than usual dose of the latter and become effective in producing sleep, the combination acting better than either drug given alone.

Both opium and morphine may be used to relieve peripheral irritation, such as gives rise to cough and asthmatic seizures, and in chronic bronchitis and phthisis. Sometimes codeine is preferable to either. For cardiac asthma and bronchial asthma, without pulmonary œdema, morphine is the promptest remedy that can be used. The state of the kidneys, however, should be determined, and if the renal functions are bad the drug must be cautiously employed, if at all. Morphine and deodorized tincture of opium are sometimes of value, in small doses, to relieve acute attacks of vomiting, but they should not be employed where nausea is of daily or frequent occurrence, as in that of pregnancy. In fact, opiates have little or no control over the latter condition. Morphine is a remedy for spasmodic and paroxysmal dyspnœa, especially that experienced upon assuming the reclining position. It is of no value for continuous and persistent shortness of breath, and examination in such instances will usually reveal a chronic kidney disorder which makes the use of the drug inadmissible.

When constipation is due to a spasmodic contraction of the unstriped musculature of the intestines, morphine is distinctly useful. This is particularly evident in the results obtained from it in lead constipation. Sometimes a similar condition of cystic spasm is responsible for retention of urine; then morphine also relieves.

Morphine is a drug of preëminent importance in convulsions. It is by far the most generally useful remedy in puerperal eclampsia. Here it is not contraindicated by the usual restrictions for its employment. In traumatic tetanus the patient should be kept fully under the influence of morphine.

Morphine must be avoided if possible in uræmic convulsions due to chronic nephritis, with uræmic or cardiac dyspnœa, or in uræmic insomnia. When uræmic eclampsia occurs in acute nephritis it may be cautiously used if other agents prove ineffective.

Opium is of value in delirium tremens, but has been recklessly used. As one looks back over the history of therapy it appears that many deaths from this complaint can be attributed to this drug alone. This is largely owing to the enormous doses that were used and the utter disregard of specific conditions. If the dipsomaniac cannot take food or cannot sleep he will die; if there is kidney disease, opium will probably kill; if there is a flushed countenance, blood-shot eyes, wild and furious delirium, pain in the head, red, dry and turgid tongue, and full bounding pulse, opium is likely to kill the patient. If, on the contrary, the skin is relaxed and moist, the circulation feeble, the face pale and the tongue moist and dirty, opium is a safe drug. The dose should not exceed one-eighth grain of morphine, or one-fourth grain at the most, every four or six hours, until sleep is induced.

Opium and morphine are much less commonly used than formerly in acute inflammations. Sometimes they are demanded in acute pleurisy and in pericarditis, and no drug so effectually helps as a single small dose of morphine in the excruciating pain of acute articular rheumatism that does not readily yield to the salicylates, macrotys, or bryonia. Both the diaphoretic and Dover's powder are useful here, and the former is the less likely of the two to provoke nausea. Formerly opium and its alkaloid were much employed to allay inflammation and quiet peristalsis, as well as to annul pain, in acute peritonitis, but of late years it has fallen into disuse.

Opium, preferably to morphine, is used in one form or another in excessive diarrhœal and other exhaustive discharges. When a persistent summer diarrhœa, with much undigested food, or an intractable mucous diarrhœa is first treated by thorough catharsis, then opium may be given, by mouth, to restrain further abnormal secretion. It has, however, proved a pernicious drug in the hands of those who unwisely use it under all conditions when safer specific means would have been far more effectual. It is a good drug, however, in persistent serous diarrhœa. An injection of morphine is the promptest drug for the relief of cholera morbus. Together with the compound tincture of cajuput this forms our best treatment. While minute doses have been advised in cholera infantum, the drug should under no circumstance or in any dose be administered to infants. In Asiatic or true cholera an injection of morphine (one-eighth grain) often checks the cramps, vomiting, and rice-water discharges. In choleraic diarrhœa, rendering one very prone to attacks of true cholera during epidemics of the latter, Locke advised: ℞ Tincture of Opium, Spirit of Camphor, Spirit of Peppermint, Tincture of Kino, aa, fℨj; Tincture of Capsicum, fℨss; Neutralizing Cordial, fℨiijss. Mix. Sig.: One teaspoonful every half hour in severe cases; three times a day in mild attacks.

Opium is a useful drug in polyuria, especially that of true diabetes, in which the drug restrains both the quantity of urine and the output of sugar. For this purpose its continuous use is permissible only in confirmed glycosuria, and it should not be employed in cases in which sugar temporarily appears in the urine. Only in incurable conditions, in which every consideration for consequences has been invoked, should opium be used in sugar diabetes. Then it is perfectly permissible, provided it gives comfort and rest to the patient. By many it is considered the best drug in diabetes, the disease establishing a tolerance for the opium, and it is given in ascending doses as long as it does good and meets urgent conditions. Singularly it is far less effectual in simple polyuria or so-called diabetes insipidus. Probably its effect in giving rest to the nervous system accounts for its value in diabetes mellitus.

Diaphoretic Powder.—We unreservedly assert our preference for this opiate, when an anodyne of this class is to be used. It will not take the place of morphine when pain is intense and must be quickly relieved; but it may be employed (whenever opium is indicated by the open pulse and moist tongue) to relieve the milder degrees of pain. It acts without the deleterious effects derived from morphine and other opium preparations. Though this product has been modified from time to time, it contains to-day, as in the original formula by Dr. Beach, powdered camphor, opium,

ipecac and potassium bitartrate—in such nicely balanced proportions that the system is gradually prepared for the action of its chief ingredient—opium. Being a decided sedative, both of temperature and nervous excitation, it may be used even where there is a high degree of fever. It is unquestionably the best pain-reliever for continuous use in pleurisy and pneumonia. The ipecac allays irritation, and if the doses be not too large or too often administered it will not usually cause nausea or emesis. Diaphoretic powder, as the name indicates, promotes activity of the skin. Diaphoretic powder not only relieves pain, but quiets nervous irritability, allays cough, facilitates expectoration, and thus proves an ideal sedative. It is the best remedy of its class for children. Diaphoretic powder, with an equal bulk of bismuth subnitrate, is the best remedy we have found for profuse irritative diarrhœa and for the watery diarrhœa of intestinal la grippe. When the patient cannot rest and there are no contraindications, it may be employed to restrain excessive diarrhœa in typhoid fever and to relieve nervous unrest and promote sleep. Taken early and in rather free doses it will check a cold. It strongly assists macrotys in the relief of myalgic and rheumatic pains, being the safest anodyne with which to relieve the pain in acute inflammatory rheumatism. There are few cases of inflammatory and painful conditions in which it will not give relief, and that without the danger attendant upon the use of many of the anodynes. It is an ideal anodyne and relaxant in various forms of colic and in severely painful menstruation. It should not, however, be used every month, or for the milder attacks of pain, lest a habit be induced. In that form of menstrual pain or ovarian irritation attended with great nervous excitability simulating hysteria, the powder infused in hot water and given hot in quite liberal doses will bring about relief quicker than any agent we know of. Singularly, when administered very hot its tendency to provoke nausea is slight, but when given lukewarm or when warm drinks follow its administration, emesis is very apt to be induced. It is of especial value in after-pains. Its effectiveness as a preparator for the administration of quinine is one of its many virtues. The ordinary dosage is from two to ten grains in cold water, repeated as the necessity of the case demands. Diaphoretic powder, known in Eclectic pharmacy as the Pulvis Ipecacuanhæ et Opii Compositus of the American Dispensatory, was introduced by Dr. Wooster Beach, and was undoubtedly a modification of the celebrated Dover's powder.

Dover's Powder.—"Dover's powder, according to the dose administered, is an excellent stimulant, sedative, anodyne, and narcotic. It has a better action than either of its chief ingredients administered separately. It is a very good agent to improve the quality of the skin, the necessary moisture being induced by the ipecac to insure the favorable action of opium, for the specific indication for the latter is a moist skin and tongue, and soft, open pulse. As a pain-relieving agent and to promote sleep, it may be used where opium alone would not be tolerated. Though profuse perspiration may be produced by it, it is also capable of checking that secretion as shown by the favorable action of five-grain doses of the powder given to control the colliquative sweats of phthisis. It should be given a half hour before the sweating begins. Dover's powder sometimes causes sickness at the stomach, and should never be followed immediately after its administra-

tion with warm drinks, but they may be used later, if desired. As a pain-reliever, or stimulant to the internal organs, or as a hypnotic, it is admissible when there is no nausea, inflammation of the brain, or high temperaure. It is an efficient drug in rheumatism, the incipient stage of inflammations, and to control cough. Hot applications to the abdomen and five-grain doses of Dover's powder with one grain of camphor, every one half or one hour, give marked relief in dysmenorrhœa. Without camphor, it is very efficient in amenorrhœa from cold, being used together with external heat. It allays nervous excitation in cases of abortion, and assists in controlling uterine and pulmonary hemorrhages; two or three grains of the powder, with a like quantity of quinine, forms an efficient treatment in neuralgia, with hot, dry skin. In dysentery, it assists the action of other remedies, as well as controlling peristaltic movements, while in irritative diarrhœa, after a mild laxative, it controls any spasmodic bowel complications that may supervene. It may be used in enteritis, both to control the inflammation and the movements of the bowels. It is useful in the early stage of renal catarrhal inflammations and in granular degeneration of the kidneys, chiefly for the purpose of maintaining a good circulation and a moist condition of the skin. *Dose*, two to ten grains, preferably in capsules." (From a previous article by the author in the *American Dispensatory*.)

RELATED DRUGS.

Heroine (heroin) is diacetylmorphine, an artificial alkaloid formed from morphine by the displacement of two hydroxyls by acetyl. It is a white, odorless, crystalline powder, of slight taste, and soluble in alcohol and very sparingly in water. The hydrochloride is very soluble in both water and alcohol and has a bitter taste. Owing to its greater solubility it is preferred to heroin. In general its action is much like that of morphine, but it is more depressant to the breathing function. On the cerebrum it has an action between that of morphine and codeine, depressing the brain more than does the latter. It is more dangerous than morphine and, like the latter, is also a habit-forming drug. In man, as well as animals, when poisoning occurs from it, excitement and convulsions take place. Heroine is eliminated to some extent by the bowels, but chiefly unchanged by the kidneys. Heroine is said not to stupefy or to induce constipation. It is mostly employed as a respiratory sedative to restrain excessive cough, and is suggested for uræmic dyspnœa. The smaller amounts are more efficient than large ones—from 1/20 to 1/6 grain, three times a day, being the usual dose.

Dionine (Dionin) is ethylmorphine, an artificial derivative of morphine. It is a yellowish-white, crystalline powder, of a faintly bitter taste, but without odor, soluble in 8 parts of water or 22 of alcohol. It lacks the narcotic power of morphine, but possesses its analgesic properties. It is employed as a substitute for the latter in gastric and intestinal ulcer, or cancer, and in suppository for painful diseases of the rectum. It does not nauseate like morphine. Though of no greater value than codeine, it has the power to relieve chest-pains and severe cough. From 1 to 5 per cent solutions may be instilled upon the conjunctiva to relieve pain in keratitis, iridocyclitis, and glaucoma. It does not anæsthetize the parts, but acts simply as an analgesic or local anodyne. The dose of dionine is from 1/4 to 3/4 grain.

Cotarnine Hydrochloride is prepared from narcotine, one of the alkaloids of opium. Under the name of "stypticin" it is employed internally to arrest oozing capillary hemorrhages, such as occur in menorrhagia and metrorrhagia, and locally in epistaxis. Its action is very similar to that of hydrastine. The dose by mouth is 1/2 to 4 grains; hypodermatically 1/2 to 2 grains.

OXYDENDRON.

The leaves of *Oxydendron arboreum*, De Candolle (Nat. Ord. Ericaceæ). A handsome tree of the eastern third of the United States. *Dose*, 1 to 60 grains.

Common Names: Sourwood, Sourwood Tree, Sorrel Tree.

Principal Constituents.—No satisfactory analysis has been made of sourwood leaves.

Preparations.—1. *Specific Medicine Oxydendron*. *Dose*, 1 to 60 minims.
2. *Extractum Oxydendri*. Extract of Sourwood. *Dose*, 3 to 6 grains.

Specific Indications.—Anasarca, ascites, and other forms of dropsy; urinary difficulty of old men; painful, burning micturition, with scanty flow of urine.

Action and Therapy.—Sourwood is a cooling diuretic and a tonic to relaxed capillaries. It is said to give relief in bowel disorders caused by a hyperæmic condition of the viscera, or to colds. It relieves the unpleasant urinary troubles of old men, when due to prostatic and cystic disorders of an atonic type—with painful micturition, scanty urine, meatal burning, and blood in the urine, the latter passing drop by drop. Its reputation rests largely upon its asserted value in anasarca and other forms of dropsical effusion, conditions in which it has been somewhat overrated.

PANAX.

The root of *Aralia quinquefolia*, Decaisne and Planchon (Nat. Ord. Araliaceæ). Middle and northern United States in rich woods; becoming exceedingly scarce; also cultivated. *Dose*, 5 to 60 grains.

Common Name: Ginseng.

Principal Constituents.—Not well determined; resinous and probably an amorphous yellow principle which has been named *panaquilon*.

Preparation.—*Specific Medicine Panax. Dose*, 1 to 60 drops.

Specific Indications.—Nervous dyspepsia; mental and other forms of nervous exhaustion from overwork.

Action and Therapy.—A mild, stimulating tonic whose effects are observed only after quite a long period of administration. It is a feeble nerve stimulant and as such is adapted to nervous exhaustion of a mild type from too close application to work, and to mild forms of nervous dyspepsia and slight stomachic debility. As a medicine it acts kindly and quietly, giving a grateful sense of comfort to the stomach.

PANCREATINUM.

Pancreatin.

A mixture of enzymes (chiefly amylopsin, trypsin, and steapsin) obtained from the pancreas of the *Sus scrofa* var. *domesticus*, Gray, or Common Hog, or of the *Bos taurus*, Linné, or Ox.

Description.—An amorphous cream-colored powder having a faint but not offensive odor, and a meat-like taste. Slowly but not wholly soluble in water, and not in alcohol. It should not be heated, and it changes gradually under exposure to the air. It should convert not less than twenty-five times its weight of starch into soluble carbohydrates. *Dose*, 2 to 15 grains.

Specific Indications.—Intestinal indigestion, with diarrhœa of fatty or chylous feces, accompanied by flatulence, nausea, vomiting, and abdominal pain; in diseases of the mesenteric glands.

Action.—In the presence of alkaline fluids, and below a temperature of 140° F (60° C) pancreatin converts starch into sugar, digests albuminoids and protein bodies, emulsifies fats, and coagulates and peptonizes milk and peptonizes gruels and articles of diet prepared from the above-named substances. It does not act well in an acid medium and is slowly decomposed by mineral acids, and promptly destroyed by a higher heat than that given above. Pancreatin and pepsin should not be given in combination.

Therapy.—Pancreatin is largely used as an enzymic digestant for the predigestion of food, for stomachic or rectal alimentation. By diluting four parts of milk with one part of water and using one part of pancreatin to four parts of sodium bicarbonate and keeping the mixture at a temperature of not more than 150° F (65.5° C) for fifteen minutes, digestion is accomplished. The ferment should then be destroyed by heating to the boiling point and the finished preparation kept upon ice until used. If digested for longer than fifteen minutes the preparation becomes bitter and is then objectionable for stomachic feeding. If desired for rectal feeding it may be digested for an hour. The practice of using nutritive enemata is growing less and less popular.

A combination of pancreatin and sodium bicarbonate is employed in achylia gastrica. As nature has provided pancreatic juice for intestinal use in the conversion of chyme into chyle one can scarcely see the wisdom of giving pancreatin in stomachic disorders, for some change must take place in the ferment under such circumstances. This change is, of course, obviated to some extent by giving it with an alkaline salt, as sodium bicarbonate. It is, however, very useful in intestinal indigestion and dyspepsia where starches and fats are imperfectly elaborated; and where fatty or chylous diarrhœa takes place, with more or less flatulence and abdominal distress. It is of much service in the intestinal dyspepsia of children who are fed chiefly upon milk and an amylaceous diet, and in consequence of imperfect digestion suffer from diarrhœa and emaciation. In some cases of chronic pancreatitis it has benefited by supplying the deficiency occasioned by the lessened supply of the natural ferment. To be effective it should be administered from two to four hours after meals. Pancreatin has been injected into the bladder to dissolve blood-clots in that viscus.

Trypsin, one of the ferments in pancreatin, has been advised in diabetes. It has no control over the disease process, but assists in the digesting of fats and proteids and thus benefits these cases indirectly when pancreatic involvement has lessened the normal supply of the enzyme. It also is used to dissolve diphtheritic membrane.

PAPAIN.

Papayotin, Caricine, Papoid.

A digestive ferment obtained from the fruit of the *Carica Papaya*, Linné (Nat. Ord. Passifloraceæ). The South American Papaw tree.

Description.—An amorphous white or yellowish-white powder, odorless, and practically tasteless. It dissolves in water and glycerin, has strong peptonizing powers, and acts in all media—acid, neutral, or alkaline—and best in the presence of a small amount of fluid. *Dose*, 1 to 5 grains.

RELATED PREPARATION.

Caroid.—A concentrated, digestive agent derived from the West Indian Papaw (*Carica Papaya*). It is an amorphous, nearly tasteless powder, of a pale yellow color, readily soluble in glycerin and water. Glycerin solutions keep indefinitely, while water solutions must be prepared fresh every three hours. It is marketed in powder, tablet, tablet combination, and in essence forms.

Action.—The milky juice of the tree bark and the fruit (from which papain is derived) are decidedly active and capable of producing violent cutaneous inflammation and a corrosive effect upon the mucous tissues, causing violent purging. It expels worms and is said to occasion abortion.

Therapy.—*External.* Both the milky juice and papain destroy warts, corns, sinuses, and the scaly and horny tissues of chronic skin diseases. A five per cent solution has been employed to dissolve diphtheritic and other false membranes. It must be applied directly to the exudates. Papain is usually used in an alkaline combination.

Internal. Papain is a vegetable pepsin, digesting proteid, but not starchy substances. It has been used in atonic and fermentative dyspepsia with painful acid eructations, flatulence and constipation. It has been less used than the animal ferments, because of the variable quality of the ferment as found in commerce. The juice of the fruit is an active anthelmintic (lumbricoids) and tæniacide.

Caroid is a digestive enzyme acting in neutral, acid, or alkaline media. In this respect it differs from the animal ferments (pepsin in acid media and pancreatin in alkaline media), which can only be used where natural conditions are just right for their action. It perfectly digests milk and eggs and meats. Caroid acts in both stomach and intestines, one of its best properties being a cleansing of the extraneous mucus from the gastro-intestinal surfaces, thus leaving them in a better absorptive condition, and adapted for the natural digestive secretions to come in better contact with the food. Moreover, its action is not suspended nor interfered with by drugs and chemicals, including intestinal antiseptics—many of which destroy the animal ferments. It is, therefore, useful in infant feeding where food is vomited, and dyspeptic and catarrhal states of the alimentary tract of adults. Locally the powder may be used to clean foul ulcers; which it does promptly. Dose of Caroid, 1 to 5 grains: of Essence of Caroid, 1 to 4 fluidrachms (adults); 1/2 to 1 fluidrachm (children). Each fluidrachm of the essence contains 1 1/2 grains of caroid.

PARAFFINUM.

Paraffin.

A purified mixture of hydrocarbons, obtained usually by chilling, pressing, and purifying the high-fraction distillates from petroleum.

Description.—An odorless and tasteless, colorless or white mass, more or less translucent, and separating from solution in crystalline form. To the touch it is slightly greasy. Freely soluble in ether, petroleum, benzin, volatile oils, and most warm fixed oils; slightly in dehydrated alcohol; insoluble in water and alcohol.

Therapy.—Used chiefly as the basis for protecting ointments for wounds, sores, and burns. Owing to its lack of solubility in ordinarily used solvents it is not suitable for use in drug-bearing ointments. Paraffin injections have come into use in subcutaneous corrective or cosmetic surgery, being particularly employed in deformities of the nose. By means of spray it has become a war-treatment remedy for wounds and burns.

PARALDEHYDUM.

Paraldehyde.

A polymeric form of acetaldehyde.

Description.—A transparent, colorless fluid of a burning afterward cooling taste, and a strong, pungent and characteristic but not unpleasant odor. Soluble in water, and less so in boiling water; and mixes freely with alcohol, chloroform, ether, and fixed and essential oils. *Dose*, 5 to 60 minims.

Action.—Paraldehyde is a powerful hypnotic, producing sleep by depressing the higher cerebral centers. Carried further it depresses the

reflexes, finally abolishing them, and paralysis and anæsthesia result. Circulation and respiration are slowed by it; in fact its action very much resembles that of chloral, but it is much less depressing and it may be given with comparative safety even when heart disorders exist. Paraldehyde is rapidly absorbed and is eliminated chiefly by the kidneys and lungs, the breath having the odor of that of one in drunkenness. While it sometimes nauseates, it seldom impairs the appetite. If long continued it may produce nutritional disturbances like those from chloral, as rashes, mucous irritation and gastric catarrh, and ulcerations about the nails and orifices. Very large doses may cause death by respiratory paralysis.

Therapy.—Paraldehyde is used to produce sleep, acting best when wakefulness is pronounced rather than when the patient enjoys the customary sleep. If pain is present, or fever exists, or there is much or ordinary worry it is apt to fail. In simple insomnia, however, it is usually promptly effective, the result being a peaceful and rather natural slumber, from which, upon awakening, the patient experiences no headache nor fatigue. The chief use of paraldehyde as a hypnotic is for the insane, being best adapted to mental excitement or agitation, mental exhaustion or delirium, and being less effectual in the melancholias and dementias. It has been very useful in acute mania with much agitation and insomnia, and in delirium tremens under like indications; sometimes it is useful in chorea and epilepsy, but chiefly to give rest when sleeplessness is a feature. Polyuria is said to be relieved by it. While usually safe even in heart affections, its prolonged use is contraindicated in cardiac dilatation accompanied by emphysema.

The great drawback to paraldehyde is its unpleasant burning taste. It may be administered in water, syrup, or glycerin, preferably aromatized with spirit of orange. A good elixir is the following, advised by Wearn: Paraldehyde, three parts; Alcohol, ten parts. Solve. Add Orange-flower Water, four parts; Simple Syrup, ten parts, and enough Distilled Water to make thirty-two parts. Color with five minims of burnt sugar.

PARÈIRA.

The root of *Chondodendron tomentosum*, Ruiz et Pavon (Nat. Ord. Menispermaceæ). A vine of Brazil and Peru. *Dose*, 5 to 30 grains.

Common Names: Pareira-brava, Pareira Root.

Principal Constituents.—Tannin, and a white and a yellow alkaloid, the latter similar to *berberine*. The white alkaloid *pelosine*, found in undetermined species and in false pareira-brava, is identical with *berberine* and *buxine*.

Preparation.—*Specific Medicine Pareira. Dose*, 1 to 30 drops.

Specific Indications.—Irritation of the urinary tract, with abdominal tenderness; frequent desire to urinate with pain in urethra and glans upon urinating; chronic cystitis and pyelitis.

Action and Therapy.—Pariera is mostly employed as a tonic diuretic, in chronic inflammation of the bladder, and of the kidneys with excretion of pus. The indications, as given above, should be observed in its use. It is not often employed.

PASSIFLORA.

The root and stem-base of *Passiflora incarnata*, Linné (Nat. Ord. Passifloraceæ). Southern United States. *Dose*, 5 to 120 grains.

Common Names: Passion Flower, May Pop.

Principal Constituent.—Traces of an alkaloid.

Preparation.—*Specific Medicine Passiflora*. *Dose*, 1 to 120 drops.

Specific Indications—Irritation of brain and nervous system, with atony; insomnia from worry or overwork, or from febrile excitement; sleeplessness in the young and the aged; convulsive movements; hysteria; infantile nervous irritability; dyspnœa; palpitation of the heart from excitement or shock.

Action and Therapy.—Passiflora is used chiefly in spasmodic affections and as a rest-producing agent. While somewhat hypnotic but acting slowly, it is better as a nerve calmative, rest resulting from its quieting influence, and sleep following in consequence of this rest rather than through any narcotic effect of the drug. It is one of the best agents we possess to allay restlessness and overcome wakefulness, when the result of exhaustion, with cerebral fullness, or due to the nervous excitement of debility. It is admirably adapted to young children and old persons to promote rest and sleep, and it acts similarly when sleeplessness is caused by worry, overwork—physical and mental—or due to the exhaustion of fevers. Few remedies are better to produce sleep during typhoid fever. The sleep induced by the restful influence of passiflora is a quiet, peaceful slumber, undisturbed by any unpleasantness, and the patient awakens calm and refreshed. Our experience with passiflora has shown it to be slow in producing sleep, and usually more effective in the second twenty-four hours than the first. Even small doses of it may cause nausea and vomiting. When this occurs its use should be discontinued. For the nervous phenomena and unrest accompanying la grippe, passiflora is a safe and often effectual remedy.

When due to atony, passiflora may relieve pain though its anodyne properties are not marked. It is occasionally useful in nervous forms of headache due to debility, and in certain neuralgic pains associated with the process of menstruation. Reflex pains during pregnancy and the menopause may be relieved by it.

Passiflora is antispasmodic. If given when the aura is felt it may ward off or mitigate an attack of epilepsy, but is of no value when the seizure takes place. It is a better remedy to limit spasms of childhood, and has thus been successfully exhibited in trismus nascentium, and convulsions from dentition, or the presence of worms. It may be used with some degree of success in preventing spasm during meningeal disorders, in chorea, and hysterical convulsions. While more or less effectual in most varieties of spasm when established, except in epilepsy, it is a far better agent for intercurrent use to control the irritability which precedes and often provokes the convulsive explosions. It has been greatly lauded in tetanus, but little reliance should be placed upon so feeble an agent in so grave a condition. Whooping-cough is often mitigated by passiflora, and for spasmodic asthma it frequently proves one of the most effective of remedies.

PENTHORUM.

The whole herb of *Penthorum sedoides*, Linné (Nat. Ord. Crassulaceæ). A perennial herb in wet situations in the United States and Canada. *Dose*, 1 to 60 grains.

Common Names: Virginia Stone-crop, Ditch Stone-crop.

Principal Constituent.—Tannin.

Preparation.—*Specific Medicine Penthorum. Dose*, 1 to 60 drops.

Specific Indications.—Chronic pharyngeal and nasal disorders, with dryness, fullness, and irritation and a purplish, congested appearance; catarrhal inflammations with profuse secretions; gastric catarrh, catarrhal diarrhœa; sponginess of the gums.

Action and Therapy.—*External.* A wash for catarrhal surfaces, producing an astringent effect but no corrugation of the tissues.

Internal. While of some value in catarrhal diarrhœa, this is a remedy best adapted to chronic catarrhal and congested states of the posterior nares and pharyngeal vault. It should be used locally while it is being administered internally; and quick results are not to be expected.

PEPO.

The dried, ripe seed of the cultivated varieties of *Cucurbita Pepo*, Linné (Nat. Ord. Cucurbitaceæ). A native of the Levant; extensively cultivated. *Dose*, 1 ounce.

Common Name: Pumpkin Seed.

Principal Constituents.—A large amount of fixed oil (over 40 per cent) and a tæniafuge principle—a greenish-brown, acrid resin—; fatty acids and two proteids—myosin and vitellin.

Specific Indications.—Tape-worm; round worm; ardor urinæ.

Action and Therapy.—An emulsion of pumpkin seeds prepared by rubbing one ounce of the crushed seeds with eight fluidounces of water, taken husks and all, after preparatory catharsis and fasting, is a safe and often efficient agent for the expulsion of tape-worm. A dose of castor oil should follow the administration of the emulsion. Sometimes oleo-resin of malefern is given with it, the concoction being sweetened if desired. Pepo will also remove round worms. The ethereal oil, in two drachm doses, has been similarly employed, but is less efficient than the whole seeds.

An infusion of pumpkin seed is useful as a lenitive and diuretic in scalding of urine, strangury and other irritative urinary disorders.

PEPSINUM.

Pepsin.

A mixture containing a proteolytic ferment or enzyme, obtained from the glandular coat of the fresh stomach of the *Sus scrofa* var. *domesticus*, Gray, or common domesticated Hog.

Description.—White, pale yellow, or yellowish lustrous scales, or a white or cream-colored powder, non-crystalline, without offensive odor, and having a feebly acid or saline taste; slightly hygroscopic; soluble in about fifty parts of water, the solution being somewhat opalescent; but nearly insoluble in alcohol, chloroform, or ether. It should digest not less than 3,000 times its weight of freshly coagulated and disintegrated egg albumen. *Dose*, 2 to 15 grains.

Preparations.—1. *Pepsinum Saccharatum*, Saccharated Pepsin (Pepsin, 10; Sugar of Milk, 90). *Dose*, 10 to 60 grains.

2. *Pepsencia* (Essence of Pepsin, Fairchild). *Dose*, 10 to 60 drops.

Action.—Long before the introduction of pepsin into therapeutics it was the domestic custom to use the dried inner lining of the gizzard of fowls

in derangements of the digestive organs to allay nausea and to aid digestion. This powdered membrane constitutes *Ingluvin*, a modern pharmacal preparation of greater purity than the domestic product, the virtues of which depend upon the pepsin it contains. Pepsin digests proteid foods, converting them successively into soluble proteids, albumoses, and peptones. This is accomplished only in an acid medium. Thus hydrochloric acid when in the proportions normally existing in the gastric juice favors this action, but when the acid content reaches 0.3 per cent, pepsin ceases to act; nor will it act in an alkaline medium. Pepsin and pancreatin should not be given in combination; nor should either be used to the extent that the stomach and bowels become deprived of their natural functions—that is, the substitution of artificial for natural digestion. Nor should pepsin be given to those who suffer from disintegrating disorders of the stomach, as ulcer or carcinoma, since the digestant power of the enzyme acts destructively upon the tissues. In such instances food should be predigested with pepsin and thus avoid the direct action of the latter upon the tissues.

Therapy.—Pepsin is of value as an aid to digestion, or rather to produce artificial digestion, where there is an inadequate secretion of gastric juice. It is therefore of value in indigestion or dyspepsia under such conditions. It appears to be more useful for infants who suffer from gastric derangements preceding or during dentition; and in infants artificially fed upon cow's milk and in whom digestion proceeds badly. In such children's disorders it corrects nausea and vomiting, diarrhœa, and tumidity of the abdomen, and aids in recovery from the emaciation so often an accompaniment of such a condition. For this purpose small doses of pepsin immediately after feeding, followed in less than a half hour by a very weak dose of hydrochloric acid, is useful; or Fairchild's Essence of Pepsin (Pepsencia) is a good preparation. Pepsin is occasionally useful in achylia gastrica. Sometimes it relieves sick headache due to gastric acidity, or will prevent a customary attack of it if given in full dose immediately after the meal. In the tardy digestion following debilitating diseases it is often of distinct service, but it should not be given for so prolonged a period as to deprive the stomach of its own natural privilege of digesting the food. When there is reason to believe that there is an insufficient proportion of hydrochloric acid in the gastric juice, pepsin in powder should be followed in a half hour by the necessary quantity of the former to insure good digestion.

Nutritive enemata or food (as eggs and meats) for stomachic alimentation may be predigested by means of pepsin.

PETROLATUM.

Petrolatum, Petrolatum Ointment, Petroleum Jelly.

A purified mixture of semi-solid hydrocarbons derived from petroleum.

Description.—I. *Petrolatum.* A yellowish to light amber unctuous mass, having only a slight fluorescence, and without or almost without odor or taste; neither water nor alcohol dissolves it; freely soluble in ether, chloroform, turpentine, benzin, and most oils.

II. *Petrolatum Album.* White Petrolatum (White Petroleum Jelly). A white or slightly yellowish, greasy mass; has similar solubilities to the above.

III. *Petrolatum Liquidum.* Liquid Petrolatum (Liquid Paraffin, Mineral Oil). A transparent, colorless fluid, odorless and tasteless when cold, and when heated having not more than a faint petroleum odor. It should be free or practically free from fluorescence. In addition to the solubilities mentioned under Petrolatum, it will itself dissolve camphor, menthol, thymol, and many other substances. It is to be had in two forms varving in viscosity tests: 1. Heavy Liquid Petrolatum. 2. Light Liquid Petrolatum.

Action and Therapy.—*External.* Petrolatum and white petrolatum are chiefly used as protectives and as ointment bases, for which they are admirably adapted. For the carrying of substances for deep penetration they are not desirable. They do not become rancid, nor are they easily affected by acids, alkalies, or reducing agents. Being unirritating they may be used as emollients and protectives in irritated conditions and inflammation, but cause some smarting upon chafed surfaces, particularly in the intertrigo of infants. White petrolatum, placed between the lids, is one of the best agents to use in burns of the conjunctiva and cornea, either from direct heat or alkalies. Liquid petrolatum, under various trade-names, is a good vehicle for other medicaments, or may be used alone, in inflammatory conditions of the nose, throat, and bronchi. It should be used by atomization.

Petrolatum in all the forms is a good lubricant for the hands and for instruments. Rubbed into the scalp (not on the hair alone) once a week, it is very effectual in preventing the falling of hair.

Internal. Petrolatum is sometimes given internally to alleviate cough. Liquid petrolatum has come into use as a lubricant for the intestinal tract in habitual and obstinate constipation, due to intestinal stasis. It has no inherent cathartic effect and acts only by softening the feces and lubricating the tract, and is thought to limit autoinfection. It is conceivable that it may readily derange the stomach and even the bowels, by preventing the natural activities of the mucosa. Sometimes it causes a slight nausea and sense of heaviness and discomfort in the bowels. From two to eight fluidrachms may be used at bed time, or broken doses may be given during the day.

PETROLEUM.

Petroleum, Rock Oil, Naphtha.
A bituminous combustible fluid issuing from the earth.

Description.—*Coal Oil* or *Kerosine.* This is the only petroleum product that we would recommend for use for purposes named below. It is a clear, bluish, fluorescent liquid, very volatile and having a distinctive, well-known odor.

Action.—Coal oil is emollient and will blister if applied to the skin and covered. We have seen the chest-tissues slough to the bones from such an application for the relief of a cold. When swallowed, as it is sometimes by children or drunken persons, it produces vomiting, dizziness, fullness, constriction and pain in the head, burning and thirst, faintness, palpitation of the heart, pallor, coldness, and sweating, weak pulse, collapse, and sometimes somnolence. It seldom kills, except in very large doses of a sulphur-bearing variety, when death results from gastro-enteritis.

Therapy.—*External.* Petroleum is only mentioned here on account of its very great certainty in destroying *pediculi*—head, body, and genital. Care should be had not to blister the tissues. Wiping the hair thoroughly with a cloth saturated with the oil and subsequently washing with soap and water is one of the most efficient means of killing both lice and nits in the hair. A similar treatment quickly destroys pediculi pubis.

PETROSELINUM.

The dried, ripe fruit and root of *Petroselinum sativum*, Hoffman (Nat. Ord. Umbelliferæ). Native of Europe; cultivated in all moderate climes.

Common Names: (1) Parsley Fruit, Parsley Seed; (2) Parsley Root.

Principal Constituents.—(Root.) An essential oil containing *Apiol;* (Fruit) Fatty oil (22 per cent), volatile oil (oil of parsley) containing *apiol* and *lævo-pinene.*

Preparation.—*Decoctum Petroselini*, Decoction of Parsley. *Dose*, 1 to 4 fluidounces.

Action and Therapy.—Decoction of parsley root is an active diuretic, as is also the oil (three or four drops). Both relieve urinary irritation, and have been extensively employed to relieve dropsical effusions when the kidneys are in a condition to respond, especially when the œdema follows scarlet fever.

Apiol is an active emmenagogue. When of good quality, doses of seven to fifteen grains are capable of producing effects similar to those of coffee—cerebral excitement with feeling of vigor and composure, and warmth in the stomach. Large doses (thirty to sixty grains) occasion intoxication, giddiness, flashes of light, ringing in ears, and headache similar to that resulting from cinchona. It is used almost entirely for the treatment of amenorrhœa, due to ovarian inactivity. It should be administered in doses of seven to ten grains, three times a day for a week or so previous to the expected time of menstruation, and given oftener when the menses appear. It relieves pain by increasing the flow when menstruation is scanty. Owing to the uncertain quality of apiol preparations they frequently fail to produce any emmenagogue effects. A liquid apiol (*Oleoresina Petroselini*) is to be preferred, given in doses of eight to twelve minims.

PHENOL.

Phenol, Carbolic Acid.
(Formula: C_6H_5OH.)
Phenol is hydroxybenzene derived from coal tar, or produced synthetically.

Description.—Colorless, aromatic, needle-crystals, separate or interlaced, or a crystalline mass at first white, but often acquiring a reddish coloration. In contact with the skin or mucosa it causes pain followed by anæsthesia, and produces a whitish eschar. It has a sharp, sweet taste, but should not be tasted. If liquefied by heat or when liquid from summer heat, and a small proportion of water is added, about 5 to 8 per cent, it will remain liquid. It dissolves in about fifteen parts of water, and very freely in glycerin, alcohol, chloroform, ether, and oils. An equal part of glycerin renders it miscible in all proportions with water. *Dose*, 1/10 to 2 grains, largely diluted.

Preparation.—*Phenol Liquefactum*, Liquefied Phenol, (Liquefied Carbolic Acid). Phenol liquefied by heating in a water bath and adding one tenth part of distilled water. If heated in the bottle the stopper must be removed. It is a colorless fluid having the taste, odor, and action of phenol. *Dose*, 1/10 to 2 minims, largely diluted. When an aqueous dilution is desired an equal quantity of glycerin should first be added to it, after which it can be mixed with water in all proportions.

Specific Indications.—A broad, moist tongue; cadaverous odor of the breath; yeasty fermentation.

For External Use.—"Fullness and relaxation of tissues. Whenever there is retraction, shrinking, and dryness it will prove harmful" (Scudder).

Action.—Carbolic acid acts destructively on the skin and mucosa, damages the renal tract, and profoundly depresses the nervous system. Unless given in toxic amounts, however, the internal administration of phenol produces no appreciable effects. Toxic doses paralyze the vaso-motor apparatus and depress the heart, stopping its action in diastole. Through

stimulation of the respiratory center in the medulla and the vagal terminals in the lungs, large doses cause full, difficult and hurried breathing. The cerebrum is depressed by excessive doses and stupor comes on. The motor nerves and the muscles do not seem to be greatly impressed by it, but the peripheral sensory nerves are first depressed and then paralyzed when the acid is applied locally. Though scarcely affecting temperature in health, even small medicinal doses markedly lower the temperature during fevers, as Hare declares, "by diminishing heat-production and increasing heat-dissipation." Carbolic acid is mostly eliminated by the kidneys, which are irritated and inflamed by it, when given in injudicious doses, leaving the body as sodium-potassium phenol-sulphonate, glycuronic acid, and hydrochinone. A little of it passes unchanged, and a portion of the acid is undoubtedly oxidized in the body. The dark color imparted to the urine is probably due to the presence of the hydrochinone, an oxidation product of phenol.

Carbolic acid is destructive to insects and the lower forms of life. A one-per-cent aqueous solution will destroy the "virulence of ordinary septic and purulent matters, of the tubercle bacillus", and in contact for hours will destroy "some of the organisms related to putrefaction." A two-per-cent aqueous solution "is required to destroy the infection of vaccine or of glanders" (Wood). Spermatozoa and the higher infusoria are destroyed by solutions of 1 to 2,500 (Dougall). It takes two days' immersion in solutions of five per cent to destroy the spores of anthrax. It checks fermentation and prevents the formation of molds in vegetable infusions or juices, and preserves animal tissues from decomposition.

To the taste carbolic acid is hot, purgent, and sweetish. Applied to the skin of man it produces a burning sensation, followed by numbness and later by anæsthesia. A peculiar whitish eschar is formed, which eventually becomes brown, and may terminate in a slough. When swallowed it precipitates the albumen of the tissues producing corrugated, whitish patches upon the lips and fauces, the esophagus and the orifices and folds of the stomach. It readily diffuses itself into the blood, producing pronounced depressant effects upon the nervous system, as vertigo, pallor, and pupillary contraction. The pulse becomes feeble, very rapid or abnormally slow, and breathing is impeded. In lethal doses these effects are intensified and include those mentioned below.

Toxicology.—Carbolic acid is one of the quickest and most fatal poisons known, being equalled in intensity and rapidity only by prussic acid and its salts. When large amounts have been swallowed the victim may drop at once and die, or the effects may last for some hours before the inevitable outcome. If not in sufficient doses to kill at once, the usual symptoms of toxic gastro-intestinal inflammation result. Fatal poisoning has been produced by injections of even weak solutions of the acid into the serous cavities, and many deaths have been recorded from absorption from phenol dressings applied to open wounds.

When a fatal dose has been swallowed, stupor, followed by profound unconsciousness, at once comes on, the skin is cold, livid, and bathed in sweat, breathing becomes rapid, short and shallow, and often stertorous and gasping, the heart's action grows gradually feebler, and death ensues from

respiratory paralysis. Constant phenomena of poisoning by phenol are a minutely-contracted pupil, and a dark-greenish, blackish, or smoky hue of the urine. It is often difficult to distinguish between apoplexy and phenol poisoning until the autopsy reveals the odor and corrosive effects. Ordinarily a history of having taken a drug, either by accident or by declared suicidal intent, the whitish eschars and the odor of the acid (if case is seen early) will aid in the diagnosis. Death has occurred in three minutes and has been delayed for sixty hours. Usually death takes place in from one to six hours. The fatal dose is not definitely known, but one drachm has been known to kill a man, while a child died from one-fourth teaspoonful of the solution (one to five).

In poisoning by phenol soluble sulphates—sodium sulphate (Glauber's salt) and magnesium sulphate (Epsom salt)—or pure alcohol, or cider vinegar, all well diluted, should be freely administered immediately. Soap suds, egg-albumen, milk, flour and water, and olive or sweet oils may be given closely following the preceding antidotes, and then quickly removed by means of the stomach pump. Emetics are apt to fail; moreover, they are likely to invite rupture of the corroded stomach. Saccharate of lime, by forming an insoluble compound with the acid, is advised by some as one of the best of the chemical antidotes. Atropine, said to be physiologically antagonistic, should be given subcutaneously to the extent of maintaining mydriasis, to prevent collapse, and ether, brandy, caffeine or camphor may be used hypodermatically to sustain the heart. Friction, artificial respiration and heat will aid in restoring restorable cases. Notwithstanding both confirmation and denial of the efficacy of sodium sulphate or magnesium sulphate, they should be given, as they can do no harm even if they fail of antidotal effects. They will do some good in recoverable cases by increasing elimination by the bowels and kidneys. The use of absolute alcohol and of vinegar has been suggested upon the evidence of their power to efface the corrosive effects of the acid upon the skin, and upon the mucous membranes of the mouth. As the latter is available in every household it certainly should be given a fair trial. Both alcohol and vinegar are useless unless given immediately after ingestion of the poison.

If a large lethal dose has been taken death will result before aid can be given, or will probably result in any event. Ordinarily very little hope should be held out when any sized lethal dose has been swallowed and some time has elapsed before treatment.

In case of recovery the sulphates should be continued in small doses for several days to antidote any remaining traces of the acid, and the after-treatment should be that of toxic gastro-enteritis and nervous exhaustion.

Therapy.—*External.* Carbolic acid is an azymotic and antiseptic, but its disinfectant property is inferior to that of many other agents ranking, in fact, among the poorest. It is also a local anæsthetic, escharotic, and antipruritic. The crude product containing cresylic acid is more effective for disinfecting purposes than the pure phenol. Both may be used in strong solutions to disinfect soiled linens, bed clothes and garments of the sick, to wash rooms in which the sick have lain, and to rid beds of vermin. They are also useful to deodorize toilets, bed-pans, and drains. For the disinfection of surgical instruments, carbolic acid is less used than formerly

on account of blunting the cutting edges and the unpleasant effects upon the hands of the operator, diminishing the tactile sense and endangering the circulation of the fingers. And its use as a local anæsthetic for minor operations for which it is effective, is largely obsolete since cocaine has come into use. Some, however, still prefer it for that purpose. It is no longer used as an antiseptic spray, as instituted by Lister, for the prevention of infection from the atmosphere in surgical operating rooms. Nor is it often applied, as formerly to wounds and abrasions, except occasionally to septic wounds.

Caution.—Dilute solutions of phenol should never be used upon the fingers or the toes. The more dilute the more dangerous, as there is just enough of the acid to act upon the vaso-motor control of the blood-vessels. Contraction of the vessels occurs (ischæmia) and is so prolonged that gangrene results.

Phenol in full strength may be used to anæsthetize the crowns of small abscesses prior to liberation of the pus. It may be injected into carbuncles in their incipiency, sometimes aborting them. Very little is required. The points of boils may be touched with it prior to opening them and the cavities lightly swabbed after evacuation. Care must be had not to use enough to poison, and by keeping well within the necrotic area poisonous absorption is not apt to take place. As a cauterant it may be used in indolent or gangrenous ulceration, small hemorrhoids, poisoned wounds, fistula in ano, syphilitic and other warts, mucous patches, soft chancre, lupus, carbuncle, and boils. Touching the pulp of a decayed tooth with it and protecting the parts by a loose packing, often relieves toothache.

The glycerite (one to four) is an effective application to acute eczematous dermatitis of the face and neck. It should be quickly brushed upon the affected parts and immediately removed by alcohol. It is painful, turns the tissues temporarily whitish, and is followed by exfoliation. It usually promptly checks the dermatitis. The glycerite is a common cauterant and stimulant for ulcers of the uterine cervix, for endocervicitis and endometritis, all chronic and with offensive discharges. The glycerite may be applied to uterine cancer to relieve pain and destroy fetor. It also removes cauliflower excrescences, and rarely may be employed as a mild caustic in diphtheria, malignant sore throat, and apthous stomatitis.

The aqueous solution of the glycerite (3 per cent) is useful upon gangrenous and other foul ulcers and when applied to necrosis of the bones. A 1 per cent solution makes a cleansing and pain-relieving mouth wash and gargle for aphthæ, tonsillitis, diphtheria, ulcerative pharyngitis, and septic sore throat. A similar solution forms an effective vaginal douche for leucorrhœa, ulcerative cervix uteri, endocervicitis, gonorrhœa, in the female; vulvitis in the young, and where there are fetid discharges. It should, as a rule, be avoided as a wash for gonorrhœa in the male and in cystitis. A one-half per cent solution of the glycerite has been advised to remove seat-worms, but there are safer and simpler agents for this purpose.

Carbolic acid has been used in several forms of conjunctivitis and in keratitis, and in aural inflammation. Such a use is inadvisable and not altogether safe. Cotton saturated with a 5 to 10 per cent glycerin solution of phenol may be inserted into the aural canal after rupture of the drum in

acute otitis media, when pain and swelling persist. The glycerin reduces the swelling by dehydrating the tissues, and the phenol allays pain and acts as an antiseptic.

A full strength to a 25 per cent solution of phenol in glycerin or oil has been effectually used hypodermatically in hydrocele and to cure hemorrhoids. For the first purpose thuja is to be preferred, and while yielding as fair results as other injection fluids its use in the latter has been attended with serious and even fatal consequences.

Carbolic acid is a very important topical medicament in skin diseases. It is mildly anæsthetic, antipruritic, and parasiticide, being most effective in disorders arising from the presence of vegetable and animal parasites. The glycerite in nearly full strength or diluted to suit the needs may be applied in pediculosis, scabies (less valuable than sulphur or Peru balsam), pityriasis, tinea versicolor, tinea tonsurans, lichen ruber and lichen planus, psoriasis, erythema, trichophytosis genito-cruralis, impetigo, prurigo, moist and itching eczema, dermatitis and lepra. A solution of the glycerite (about 1 to 20 or 30) is invaluable in general pruritus, and especially in that form known as winter itch and in the itching caused by jaundice. An ointment (10 grains to the ounce) is sometimes preferred in skin disorders, or the acid is added to ointments of other cutaneous remedies.

In small burns and scalds a one-half per cent solution in olive oil has proved very effectual, both to relieve pain and promote healing. Bites and stings of insects may be similarly treated.

The hypodermatic injection of a 2 per cent solution of carbolic acid has been advised in tetanus, not more than from five to fifteen grains being given in a day. The fearful mortality of this disease justifies the employment of even such severe measures.

Dobell's Solution, a carbolized and glycerinated alkaline solution, is a favorite wash for acute and chronic nasal catarrh and for the coryza of influenza.

Phenolized Camphor (melted crystals of phenol, 1; camphor, 3) is a useful and painless application to incipient tonsillitis, and to abrasions, slight wounds, and small burns and scalds.

An inhalation of carbolic acid is valued in pulmonary gangrene. A 2 per cent spray may be serviceable in coryza, fetid bronchorrhœa, influenza, nasal catarrh, ozæna, ulcerated sore-throat, chronic pharyngitis and chronic bronchitis. In phthisis not more than one-half per cent solution should be so employed, and even then it should be discontinued if it causes faintness, giddiness, or trembling, with an increased weakness of the pulse. For most of the preceding conditions the spraying by Dobell's solution may be substituted.

Internal. The use of phenol internally is almost wholly confined to fermentative stomach and bowel disorders. It is indicated by a putrescent or cadaverous odor of the breath and a broad, moist tongue. "It is contraindicated by a pinched or contracted condition and a long, dry, and pointed tongue" (Scudder). Though none too desirable as an internal medicine, it may be cautiously employed in the following conditions, stopping the use of the acid upon the appearance of smoky urine or drowsiness: Vomiting or diarrhœa due to fermentation of food in the stomach or

bowels, or to the ingestion of unsound food-stuffs; vomiting from yeasty fermentation, with the presence of sarcinæ or torulæ or both; nervous vomiting from gastric irritability; gastric pain (gastrodynia) following eating; flatulence from decomposed food or imperfect digestion; offensive breath from putrefactive changes in the stomach; and sometimes in cholera infantum and scarlatina anginosa, being especially cautious with young children, and giving it to them only in the minutest doses. Bismuth aids its action in diarrhœas, and for general purposes the following may be administered: ℞ Glycerite of Phenol (Liquefied Phenol, 1; Glycerin, 4), gtt. v to xxx; Water, fl℥iv. Mix. *Dose*, One teaspoonful every two to four hours; children should have much smaller amounts.

SUBSTITUTES FOR PHENOL.

Creolin is a dark-brown, syrupy fluid obtained from soft coal and is one of the liquid cresols or cresylic acids—coal-tar derivatives. It is recommended as a substitute for carbolic acid, though it is liable to produce the same type of poisoning. Accredited with antiseptic and germicidal powers, it has been chiefly employed in hand preparation in obstetrics, and for vaginal, cystic, and nasal irrigations. Being an emulsified suspension it mixes cloudy but perfectly with water. Solutions of 1 to 2 per cent strength are usually preferred. It may also be employed in foul ulcerations, upon fetid feet, in ozæna, and purulent otorrhœa, in solutions ranging from one part in 100 to one part in 1,000.

Lysol is prepared from a certain fraction of tar oil saponified by an alcoholic solution of fat. It is a clear, brownish, oily liquid, having the odor of creosote, and imparting to flesh and instruments a slippery feel. It mixes clear with water and is preferred over creolin, in that instruments may be seen in its solutions. Poisoning is possible from it as from phenol, whose action it possesses. It is largely used by some for obstetric cleansing and in vaginal douches. Much irritation is often caused by its injudicious employment, especially by long-continued use for the vaginal toilet. Solutions of 1 to 2 per cent are generally employed.

Liquor Creolis Compositus or Compound Solution of Cresol (the latter a mixture of isomeric cresols from coal tar, occurring as a colorless or straw-colored fluid gradually becoming yellowish-brown when long exposed to light) is designed to take the place of creolin, lysol, solveol, solutol, and similar cresol proprietary preparations on the market. It is composed of 50 per cent of cresol, the rest being alcohol, linseed oil, potassium hydroxide, and water. It is intended for use as a wash and dressing in obstetrics, infected wounds, and suppurative conditions, periostitis, and osteoperiostitis of the feet. Like all cresol preparations it produces poisoning similar to that from phenol (carbolic acid). Compound solution of cresol is used in dilutions of 1 to 20 to 1 to 1,000.

Trikresol (a combination of ortho-, meta-, and paracresol) occurs as a white liquid of a creosote odor, forming clear solutions in water up to about 2 1/2 per cent. It is said to be less poisonous than phenol and not to benumb the skin. It is regarded by some as a useful collyrium (1 to 500 or 1 to 1,000); and is occasionally used in 1 per cent solution in general surgery. It is the preservative agent in some of the commercial antitoxins and sera.

PHENOLPHTHALEINUM.

Phenolphthalein.

A derivative of phenol. (Formula: $C_{20}H_{14}O_4$.)

Description.—A permanent, white, or slightly yellowish-white powder, tasteless and odorless, soluble in alcohol and sparingly in water. Solution turns red upon addition of alkalies. *Dose*, 2 to 5 grains; average dose, 2 1/2 grains.

Action and Therapy.—This agent, through solution in the bowels owing to the presence of alkali and bile, provokes a mild laxative effect, which may continue for several days. This prolongation is due to the fact that some of it, being absorbed from the bowels, into the blood, passes to the liver, and there in contact with theibile is liberated into the intestines, continuing its action until it is all excreted. It is eliminated chiefly by the bowels, though some passes by way of the urine, to which, if the latter be alkaline, it imparts a bright pink color. Phenolphthalein, in one or two grain doses, given at

bed time, causes without pain or griping, a free and normal passage of feces. It may be used for a long time without harm, and is recommended, either alone or with aloes, as a remedy for habitual constipation.

PHENYLIS SALICYLAS.

Phenyl Salicylate, Salol.
(Formula: $C_{13}H_{10}O_3$.)

Description.—This is the phenyl ester of salicylic acid and derives its name, salol, from the first syllable of the word *sal*icylic and the last syllable of the word phen*ol*. It is a white, faintly aromatic, crystalline powder, having a peculiar characteristic taste; very soluble in alcohol, ether, chloroform, and oils, but very sparingly in water. *Dose*, 5 to 15 grains, but not more than thirty grains per day.

Specific Indications.—Turbid ammoniacal urine, with renal torpor (when the kidneys are intact); gastro-intestinal fermentation; rheumatism, with functional renal inactivity; choleraic discharges.

Action.—Through the agency of the pancreatic juice, salol is split up in the small intestines into salicylic acid (about 60 per cent) and phenol (40 per cent). Therefore, if the dose be very large the toxic effects of these two agents respectively may be expected. (See *Acidum Salicylicum* and *Phenol.*) Without question the more dangerous product is the carbolic acid (phenol), the effect of which may be recognized by the smoky urine (carboluria), one of the prominent symptoms of poisoning by salol. Circumstances seem to control the action of salol; if the pancreatic fluid be abundant, or the dose large, or the kidneys inactive, toxic symptoms come on quickly, and as the drug is slowly absorbed and slowly eliminated large doses or overlapping doses may be cumulative. The kidneys are extremely susceptible to this drug, and it should never be given when there are known acute or chronic structural diseases of these organs. Salol has produced confirmed albuminuria; hence in view of these known conditions and the power for harm that may be exerted by its decomposition products, the drug should not be recklessly employed. Should diarrhœa be induced by it the renal effects are less likely to occur. Other untoward symptoms are urticaria, herpes, vomiting, persistent anorexia, sweating, and the intoxicating effects of salicylic acid (salicylism). Salol gives to the teeth a peculiar sensation, as if being coated with rubber. It is, as a rule, not irritant to the stomach.

Therapy.—*External.* Salol, triturated with starch (1 to 5 or 6) or in aqueous dilution of its alcoholic solution, may be used as a germicide and antiseptic in fetid catarrh (by insufflation or spray), stinking ulcers, sycosis, pustular eczema, impetigo contagiosa, and other skin diseases. It can only be effective when in the presence of alkaline secretions or fluids. Locke advised equal parts of starch and salol dusted upon the skin to relieve the burning and lessen the inflammation in erysipelas.

Internal. Salol is a good antirheumatic and efficient intestinal antiseptic. Owing to the fact that it does not dissolve in the stomach it is often used to advantage in acute rheumatism when salicylic acid and the salicylates cannot be employed on account of disturbing gastric comfort and digestion. It is, however, not so effective as these salts, and necessarily acts much slower as it is not dissociated into its components until it reaches the alkaline field of the intestines. We have found it of value in subacute

arthritic pain and swelling of the fingers in the middle aged and aged, a condition probably due either to the intestinal absorption of putrefactive products, or to faulty functioning of the kidneys. Salol is also useful in sore throats of the type that usher in rheumatic attacks, and in muscular rheumatism from cold and exposure. Lumbago has been relieved by it either when chiefly myalgic or due to pressure of intestinal gases; and the same is true of sciatic neuritis. Chronic pharyngitis of lithemic subjects is often quickly relieved by salol. It likewise benefits in neuralgias due to exposure. Salol is sometimes useful in rheumatic headache and influenza, but, as a rule, it is used in the latter affection without rhyme or reason, as it is frequently in ordinary colds, and often with no benefit and probably with harm.

Salol is a perfectly satisfactory drug in intestinal toxæmia due to fermentative and putrefactive changes of the contents of the bowels, and it corrects the intestinal indigestion so often caused by these changes. Even pernicious anemia of the milder type and presumably dependent upon intestinal decomposition is said to be improved by this drug. Fetid diarrhœa, chronic colitis, acute fermentative diarrhœa and dysentery, biliary catarrh, and similar conditions are benefited through the antiseptic action of the compound. The diarrhœa of typhoid fever may be similarly treated, provided the alkalinity of the intestinal contents is not greatly reduced and the kidneys are intact and functioning. It is one of the few drugs that is asserted to have proved successful in Asiatic cholera.

Salol is also a urinary antiseptic. It is safe when there is no organic lesion of the kidneys; it is even useful in pyelitis, provided the secretory cells of the organ are not inflamed or destroyed. It should be used with caution, however, even in infection of the urinary tract, and then usually in connection with alkaline diuretics. It should especially be avoided in any acute renal inflammation threatening the integrity of the kidney. Many rely on it in acute gonorrhœa for its property of rendering the urine antiseptic. Locke advised it to render the urine acid and to prevent and correct decomposition in cystitis.

PHOSPHORUS.

Phosphorus.

A non-metallic element obtained from calcium phosphate by reduction with charcoal (U. S. P.). (Symbol P).

Description.—A nearly colorless, waxy, translucent solid of about the consistence of beeswax, whose surface gradually becomes red, white and sometimes black. It has a disagreeable, distinctive odor and taste, *but should not be tasted except when highly diluted.* Exposed to air it gives off white fumes, which are luminous in the dark, and if exposed may take fire spontaneously. The fumes have the odor of garlic. When heated with hydrogen it changes to the non-poisonous red amorphous phosphorus. While almost insoluble in water, it imparts to it the characteristic phosphorus odor and taste. Soluble freely in carbon disulphide and chloroform, less freely in absolute ether, and more sparingly in dehydrated alcohol.

☞"Phosphorus must be carefully preserved under water, in strong, well-closed containers, in a secure and moderately cool place, protected from light" (U. S. P.). *Dose,* 1/240 to 1/60 grain; minute doses are preferred by Eclectic physicians.

Preparation.—*Specific Medicine Phosphorus, Dose,* 1/30 to 5 drops.

Specific Indications.—Nervous exhaustion; general atony; vesical and prostatic irritation, with mucoid discharges; sense of fullness and dragging in the perineum; sense of weariness in lower extremities; mucoid

rectal discharges; low muttering delirium in low fevers, with involuntary discharges; chronic bronchial and pulmonic affections, with heat, dryness, hacking cough, and difficult expectoration of muco-purulent or sanguineous sputum; rusty sputum; pulmonary hyperæmia; pinkish countenance with staring eyes; expressionless pasty tongue; insufficiency of the internal recti muscles of the eye; sexual debility.

Action and Toxicology.—In minute doses, and properly diluted, phosphorus becomes absorbed and acts as a stimulant and tonic to the nervous, vascular, and secreting organs. It excites the mental faculties and the sexual feelings, raises the temperature of the skin, increases the frequency and volume of the pulse, and promotes the secretions. Cell growth, particularly of the skin and bones, is quickened by it. In large doses, it operates as a poison, causing gastro-enteritis, becomes absorbed, and produces tissue changes and convulsions, insensibility, and death. Fatty degeneration of the liver and heart are chief among its results. According to Mialhe, the absorption of phosphorus (and also of sulphur) is due to the fatty matters contained in the alimentary substances, which, after affecting its solution, serve as the vehicle for its introduction into the economy. The phosphorus so absorbed may remain several days within the body without undergoing any sensible change, as its union with the fatty matters enables it to almost completely escape the action of the chemical agents with which it comes in contact, and to diffuse itself throughout the system in the same manner as poisons soluble in water. Hence the reason for the phosphorescence and the garlicky odor observed at the autopsy of persons who have been poisoned by phosphorus. Phosphoretted hydrogen acts similarly, as when introduced into the blood, it gives rise to the production of water, and to a precipitate of phosphorus in a state of minute division eminently suited for the development of its deleterious action.

Acute Phosphorus Poisoning.—As a poison, phosphorus acts both locally (as an irritant) and specifically. The symptoms of acute poisoning from the ingestion of phosphorus are as follows: Within a few minutes, or, more generally, after a few hours, the victim experiences a disagreeable, onion-like, or garlicky taste, and the breath is observed to be alliaceous. Burning pain (not intense) in the stomach, with a sense of oppression in that organ, follows, and there is general malaise and eructations of garlicky vapors of the drug. The vapors may show luminosity if the room be dark. Vomiting of luminous, coffee-colored, yellowish, or bilious material is common, and often violent and frequent. The abdomen is hot, distended, and tender upon palpation. Purging is not a common occurrence (constipation at first being the rule), but when taking place the stools are loose, dark, or bloody and painful. The stools are often phosphorescent in the dark. When death occurs early, the symptoms rapidly intensify until collapse, followed by death, takes place. Should death be delayed, however, for several days, as is frequently the case, and particularly when active symptoms are late in developing, jaundice supervenes and becomes rapidly progressive. The irritant symptoms usually subside, forming an apparent intermission for the better, but the danger is as great as ever. The pulse and temperature, which are at first above normal, soon become subnormal, great prostration ensues, the pulse becomes feeble and rapid, and some-

times the radial pulse is almost imperceptible, the skin is cold, the urine scanty, albuminous, and contains tube-casts. Fatty degeneration of the liver and kidneys has taken place. At this stage the stools are usually abundant and dark-greenish or bloody. The skin may show hemorrhagic areas and petechial spots, and wounds or sores upon the surface bleed freely and easily. The nervous symptoms follow the establishment of jaundice. Coma ensues, associated with jactitation or convulsive muscular movements, and death occurs usually about five or six days after the ingestion of the poison. In phosphorus poisoning, death does not usually take place until several days have elapsed. The shortest period on record is one-half hour (Habershon, in Taylor's *Medical Jurisprudence*). Less than one grain (1/8 grain, Wormley) has caused death. Only white or ordinary phosphorus is poisonous, red or amorphous phosphorus being non-toxic. Locally, phosphorus produces dangerous burns quite difficult to heal. The pregnant woman invariably aborts when poisoned by phosphorus.

Chronic Phosphorus Poisoning.—When phosphorus vapors come in direct contact with bone, necrosis of the part generally results. Formerly it was quite common for those manufacturing lucifer matches to be thus affected (particularly the jaw bones), but improved methods and industrial laws have largely overcome the danger from this source. This necrosed condition is now believed to be rare, unless the phosphorus can come into direct contact with the bare bone, as through carious teeth, or ulcers of the mouth. However, it has been known to produce caries of the teeth, with abscesses, and thus become extended to the alveolar processes. The foregoing bone effects and the following symptoms constitute chronic phosphorus poisoning: Nauseous eructations, vomiting, purging, burning pain in the stomach, hypersensitiveness to cold, stiffness, numbness, and pain in the limbs and joints, wasting, dyspepsia, straw-colored or grayish skin, and hectic fever, with respiratory irritation and cough. The patient may die of the effects of the phosphorus direct, or he may die of dyspepsia or phthisis. The chief post-mortem changes from phosphorus poisoning are fatty degeneration of the liver, heart, kidneys, and other organs, as well as of the voluntary muscles; some surface disorganization of tissue may be observed, chiefly in the stomach. The blood is thick and dark-colored. The liver is deep-yellow, interspersed with reddish patches, and altogether closely resembles the effects of yellow atrophy of the liver, which disease poisoning by phosphorus most nearly resembles. The whole interior of the body is phosphorescent, and the luminosity may persist for months.

Treatment of Phosphorus Poisoning.—In poisoning by phosphorus the stomach should be evacuated as speedily as possible. For this purpose sulphate of copper, which is itself reputed one of its best chemical antidotes (forming the black phosphide of copper), may be given in 2 or 3-grain doses, every five minutes, until vomiting ensues. Apomorphine hydrochloride may be used subcutaneously if desired, to induce emesis. After vomiting has freely occurred, small doses of the copper sulphate (2 grains) should be continued every half hour, so that any free phosphorus may be converted into the black phosphide, at the same time endeavoring to prevent further vomiting by means of ice or of small doses of morphine sulphate. After full emesis by copper sulphate, copper carbonate followed by vinegar,

has been successfully used as an antidote. Thornton declares that copper sulphate antidotes only in doses themselves dangerous. Following the use of the copper sulphate, administer French oil of turpentine, 2 fluidrachms of which may be given in mucilage of acacia every fifteen minutes until one ounce is taken. Old (ozonized) oil should be preferred. Ordinary turpentine is not effective unless old or ozonized, and is even dangerous on account of its phosphorus solvent properties. Indeed, in phosphorus poisoning no albuminous or oily bodies (except French oil of turpentine) should be given, lest by their attenuation of the poison they favor its toxic action. Permanganate of potassium and hydrogen peroxide are said by recent writers to be the most effectual antidotes. Acidulated laxative drinks are advisable, with abstinence, or, at all events, a prohibition of any kind of food containing fatty matter. After the use of the antidote free purgation should be produced by means of magnesium sulphate, magnesium citrate, or Rochelle salt. No remedy is effective as an antidote after degeneration of tissue has begun. The best preventives of chronic phosphorus poisoning among those engaged in the manufacture of lucifer matches are a wetted sponge over the mouth, good ventilation of the factory, and personal cleanliness.

Therapy.—Though accredited with various therapeutical properties, phosphorus may be said to be chiefly a remedy for nerve exhaustion with prostration of the vital powers. Though a powerful nerve stimulant, it is still a question whether its action is temporary, tiding the patient over a critical period, or whether it primarily produces a permanent tonic effect. That its effects are but temporary is the view held by most observers, and tonic effects follow this reassertion of nerve power. The cases for phosphorus are those of atony, adynamia, debility, low nerve force, or nerve exhaustion. The phosphorus patient is weak, digestion and blood-making are imperfect, the glandular secretions and the excretions are defective, there is languor, lassitude, sexual debility in the adult, brain-fag, and general apathy. Sympathetic innervation is below par, the skin is dull and inactive, the tongue lifeless in appearance, and the whole system shows a lack of activity and evidence of imperfect elaboration of the blood, and defective nutrition of the nerve centers. In such conditions, through its primary stimulating power, it may prove tonic and restorative. Locke says of phosphorus that "it bears the same relation to the nervous system that iron does to the blood."

Bearing in mind the indications above given, phosphorus becomes an important remedy in many nervous diseases. It was early employed as a stimulant in convulsive and old paralytic cases, and for progressive locomotor ataxia, though it is now seldom or never used for these disorders. In all such cases inflammation should be absent. When paralysis of spinal origin is functional, it is often more serviceable than strychnine (Locke). It frequently proves the best remedy for long-standing, obstinate neuralgia, particularly in the aged. In such cases nerve exhaustion is a marked symptom. It occasionally benefits in epilepsy with the same nerve debility, or when due to sexual excesses, or abuse. Ordinarily, however, it is of little value in this disease. In neurasthenia, due to debility or to physical or mental overwork, or to sexual weakness, and in degenerative nerve-changes

due to senility, it often proves a good remedy. When insomnia is due to cerebral anemia, phosphorus may sometimes give rest and sleep, and it occasionally proves useful in the debility due to acute and chronic alcoholism, the morphine habit, and in melancholia, dementia, and hysteria. For mental failure, mental aberrations, paralysis agitans due to imperfect nutrition or to degenerative changes, and in atheroma of the cerebral vessels, the remedy has been highly endorsed. Obviously, it never cures nor does much good in shaking palsy (paralysis agitans). Though not an analgesic proper, it relieves pain of a neuralgic and rheumatic character, particularly rheumatic headache, when due to great debility, and when the pain suddenly subsides in some other part of the body and quickly attacks the head. It is a fairly good remedy for intercostal neuralgia in the debilitated, and a good agent for the relief of nervous headache in similar subjects.

Phosphorus in minute doses (specific medicine, gtt. iij to v in aqua, fl℥iv; teaspoonful every hour) is a valuable agent in low grades of pneumonia and bronchitis. It acts better in the second stage of pneumonia than aconite. It is an agent of great power in lung hepatization. In chronic pneumonia with secretion of muco-pus and expectoration of blood—the patient hastening on to consumption—this remedy or the hypophosphites will sometimes be of service. In the extreme debility of typhoid pneumonia, no agent is more efficient than phosphorus. Rust-colored sputum is one of the strongest indications for phosphorus; hacking, dry cough in the early stage of phthisis is also an indication for this drug. Chronic bronchitis, with bloody and muco-purulent expectoration and chronic laryngitis, with marked dryness and sense of heat in the throat, and associated with nervous depression, call for small doses of phosphorus. Pleurisy, in some subjects, and especially in the chronic form, may require phosphorus to assist in the absorption of the effusion. In such cases the patient is extremely weak, the pulse feeble, tongue pasty, and appetite and digestion much impaired. Phosphorus has been successfully used as a stimulant to the nervous centers in low fevers with low, muttering delirium, unconsciousness, and in involuntary passage of the fecal and urinary discharges. It is also useful as a cutaneous stimulant in some exanthematous diseases in which the eruption has receded from the skin. Ten or 20 minims of specific medicine phosphorus, added to 4 fluidounces of water, and given in teaspoonful doses every two, three, or four hours, is declared by Scudder very useful in cholera infantum where there is nervous exhaustion, the discharges from the bowels being slimy and frothy, with tympanites.

Minute doses of phosphorus have been advised, chiefly in conjunction with arsenic, for boils, carbuncles, scrofulous abscesses, acne, herpes zoster, scald-head, lepra, lupus, psoriasis, fistulæ, osseous caries, and enlarged glands. In the so-called scrofulous diathesis it is sometimes useful, and in such a state it relieves leucorrhœa, chlorosis, nasal catarrh, colliquative sweating and debilitating discharges in phthisis, especially the diarrhœa of phthisis.

The sexual and urinary apparatus are impressed by phosphorus. Its effects in sexual weakness are probably not due so much to a special affinity for these parts as to its general stimulating effect upon the body at large. However, it appears to improve the circulation and innervation of the genito-

urinary tract, and it is a good remedy to improve vesical, prostatic, and testicular irritation, whether arising from or associated with sexual excesses (Scudder). It has given good results in "chronic cystitis, chronic prostatitis, enlarged and pendulous testes, gleet, chronic ovaritis, and vaginitis" (Scudder). To these we may add chronic irritation of the kidneys and ovaries, and atonic dysmenorrhœa; also chronic nephritis, with atony and the voiding of milky urine. "In the treatment of disease from sexual abuse, as in involuntary seminal emissions with marked atony and morbid irritability, it is the very best remedy known" (Locke). It has long been used as a remedy for impotency due to excesses or to debility of the sexual organs or of the system in general.

In ocular and aural therapeutics, phosphorus is sometimes useful. Thus, in functional inner ear disorders, associated with general neurasthenia, it occasionally benefits, and it is credited with quieting tinnitus aurium. The dose is about 1/100 grain, 4 times a day (Foltz). In eye affections it frequently aids in a cure, particularly if there be a scrofulous or tubercular taint. It often quickly relieves retinal hyperæmia and retinitis. It has also benefited disseminated choroiditis and retinochoroiditis. Foltz (*Dynamical Therapeutics*) declares that it will rapidly increase visual acuity in functional or reflex amblyopia, provided no morbid process is present, and that it is the best remedy for insufficiency of the internal recti and paralysis of the ocular muscles. The dose for this purpose is from 1/200 to 1/100 grain. Others have pronounced it a good remedy for asthenic amaurosis of functional character.

Phosphorus has been endorsed as a remedy for pernicious anemia, but often fails. Locke advises minute doses of phosphorus for "muscular weakness, as in children who are slow in learning to walk." In fatty degenerations of various organs it has been advised, but must be used with great care and the dose must be minute. It is especially a good remedy for osteomalacia and rickets, and for the tardy union of fractured bones.

Phosphorus may be given in solution in alcohol, ether, olive, almond, or cod-liver oil, chloroform, glycerin, or in pill. The dose of phosphorus ranges from 1/250 grain, cautiously and gradually increased to 1/16 grain, from 1/100 to 1/60 grain being the usual range of dosage. Elixir of phosphorus, 15 minims to fℨj—(1/260 to 1/65 grain); phosphorated oil (1 per cent phosphorus), 1 to 10 minims; specific medicine phosphorus is the form usually employed in Eclectic practice, the most common prescription reading: ℞ Specific Medicine Phosphorus, gtt. v to xx, Water, fℨiv. *Dose*, 1 teaspoonful every two to four hours. One minim of specific phosphorus represents 1/240 grain of white phosphorus. As phosphorus appears to accumulate in the system, its action should be carefully watched, and as soon as vomiting, diarrhœa, or other symptoms of derangement of the digestive organs appear, the use of the remedy should be temporarily ceased, and, after two or three days, be again commenced with the smallest dose, as before. Indeed, when no symptoms whatever manifest themselves, it will be prudent to cease its administration every fifteen or twenty days, recommencing its use in four or five days, and so on.

PHYSOSTIGMA.

The dried, ripe seed of *Physostigma venenosum*, Balfour (Nat. Ord. Leguminosæ). A climbing perennial, native of Calabar, in the Gulf of Guinea, on the western coast of Africa, and around the sources of the river Coma, near Gabon. River banks. *Dose*, 1 to 3 grains.

Common Names: Calabar Bean, Ordeal Bean, Ordeal Bean of Calabar.

Chief Constituents.—*Physostigmine* or *eserine*, a very poisonous base; *calabarine*, less poisonous and probably a decomposition product of the former; *eseridine*, *eseramine*, all of which are alkaloids; and *phytosterin*, closely resembling animal cholesterin.

Preparation.—*Specific Medicine Physostigma*, 1/30 to 5 drops. (For specific purposes in nervous disorders the small fractional doses are preferred.)

Specific Indications.—Feeble and tremulous pulse, cool surface, cold extremities, and contracted pupils; or pupils dilated, with small, rapid pulse; mental torpor in cerebro-spinal meningitis; difficult breathing with sense of constriction; meteorism.

Action and Toxicology.—Calabar bean is a spinal paralyzant, the brain being apparently unaffected by it. It is also probably a direct muscle poison, though this is doubted by Wood. The motor and reflex centers of the cord are depressed, and finally paralyzed by it when given in poisonous doses. It also acts upon some of the medullary centers. The nerves are apparently not much affected by it, though some contend that it first stimulates and then destroys the excitability of their terminals in the muscles. Unstriped muscular tissue and the glands are stimulated by it, and peristalsis greatly exaggerated and intestinal secretion increased. It lengthens the diastolic pause, thus slowing the heart-beat and increasing its power, probably through its action upon the heart-muscle itself, or by stimulating the vagal terminals and the cardiac ganglia. Arterial tension is first raised by it; then lowered. When dyspnœa occurs it is thought to be due to the tetanic action of calabarine, which is present in variable proportions in commercial extracts of physostigma, thus rendering the latter undesirable preparations. Physostigma and its alkaloids are eliminated chiefly in the urine, the latter being then capable of producing poisonous effects when tested upon the eyes of animals. Physostigma kills by centric respiratory paralysis.

Physostigma (and physostigmine [eserine] more powerfully) reduces intraocular tension and strongly contracts the pupils, the myosis taking place in a few minutes and lasting from six to twelve hours, and sometimes to a lesser degree for several days. It temporarily increases the power of accommodation for close vision, which action may be followed by spasm of accommodation. These effects often cause severe pain, which may continue for hours. Much diversity of opinion prevails as to the manner in which the drug acts upon the eye. Wood believes its ocular effects are caused by "local peripheral influence;" "that there is a simultaneous stimulation of the oculo-motor nerve-ending and paralysis of the peripheral sympathetic nerve-ending." As the pupil is known, in overwhelming doses, in human poisoning, to dilate he concludes: "that when the alkaloid is in sufficient amount the primary oculo-motor stimulation is followed by oculo-motor palsy". The view that the drug acts by constricting the vessels of the iris, or the view of Schmiedeberg, that eserine acts directly by stimulation of the iris muscle, is no longer generally held, though Hare still maintains the latter

view. In fact, the whole range of physiological action of physostigma and its alkaloids is discordantly voiced by experimental investigators.

Full doses in man produce extreme prostration and muscular weakness, loss of mobility, dizziness, slow, feeble and irregular pulse, nausea, and sometimes vomiting. Severe diarrhœa often takes place and the pupils are usually contracted. If the alkaloid or the extract be applied to the conjunctiva close contraction takes place, even though atropine has previously produced dilatation; and the effects are confined only to the eye so treated. Poisonous doses increase the foregoing symptoms, with the addition of muscular tremors or fibrillary twitchings (confined only to portions of the muscle), the reflexes are abolished, respiration and circulation are extremely depressed, and the victim dies of paralysis of the medulla-center of respiration.

The treatment of poisoning by physostigma and its alkaloidal salt consists in the hypodermatic administration of a full dose of atropine sulphate, the best-known physiologic antidote (prompt emesis and tannic acid if the poison has been swallowed), the application of external heat, and respiratory and cardiac stimulation by means of alcohol, ether, ammonia, digitalis, and strychnine. Wood suggests the availability of the antagonizing effect of pilocarpine (which by some is regarded equally as antidotal as atropine) in doses proportionate to the quantity of poison ingested.

Therapy.—*External.* Extract of physostigma for local use in ocular diseases has been entirely replaced by physostigmine. (See *Physostigminæ Salicylas.*)

Internal. Physostigma, in medicinal doses, has scarcely any effect upon the circulation, and but little on breathing. The secretions of the salivary, sweat, intestinal and mammary glands are increased by it. (See also *Physostigminæ Salicylas.*) The drug is employed chiefly to reduce spasm and give tone to relaxed muscular walls of the stomach and bowels, and in the smaller doses in inflammatory diseases of the meninges. It has failed to sustain the reputation once accorded it in chorea, epilepsy, trismus neonatorum, and puerperal convulsions and reflex paralysis. In traumatic tetanus it has failed more often than it has benefited, but charity is held out in the view that probably inert preparations have been responsible for its failure, and the drug has not therefore had a fair trial. It is one of the suggested antidotes for strychnine poisoning, the alkaloid being preferred. For all of the above purposes the physiological doses have been advised.

In minute doses, however, physostigma gives favorable results in certain diseases of the brain and spinal cord. The usual prescription for this purpose is: ℞ Specific Medicine Physostigma, gtt. v; Water, fl℥iv. Mix. Sig.: *Dose*, one teaspoonful every two to four hours. The indications are a cool skin, cold extremities, feeble tremulous pulse, and contracted pupils. Occasionally the dilated pupils will guide if associated with a rapid, small and tense pulse. It is one of the few agents which has exerted a favorable influence in cerebro-spinal meningitis, the dull intellect, pupillary contraction, and small, weak pulse leading to its selection.

Physostigma, in the form of the extract or the specific medicine, may be used in weakened states of the gastro-intestinal canal, when giving rise to dilatation, visceral ptosis, and flatulence. Thus it is indicated in gastric

and intestinal dilatation, fecal accumulation, and sometimes in tympanites, catarrh of the intestines and bladder, and constipation, with hard, dry feces. Nux vomica aids its action in intestinal atony, a state present in all of the above-named disorders. On account of its action upon the smooth muscular fibres of the intestines it is sometimes an ingredient of pills for the treatment of constipation. Owing to its stimulant action upon the bronchial muscular fibres it may be used in chronic bronchitis with bronchial dilation, with dyspnœa, bronchial asthma and emphysema, to assist by its contractile force in expelling mucus. For the respiratory disorders quite full doses are required, and other agents, more kindly in action, are preferred in Eclectic practice as stimulating expectorants. From 1/20 to 1/10 grain of the extract is sufficient for the effect upon the bronchial and intestinal musculature. The same, or eserine (1/60 grain) has been used for excessive sweating, as in the night sweats of phthisis. Wood reports a case of phantom tumor, associated with intestinal dyspepsia, asserted to have been cured by it.

PHYSOSTIGMINÆ SALICYLAS.

Physostigmine Salicylate, Eserine Salicylate.

The salicylate of an alkaloid obtained from Physostigma. (Formula: $C_{15}H_{21}N_3O_2$, $C_7H_6O_3$.)

Description.—Colorless or scarcely yellowish, long, glistening crystals, without odor and very bitter. Upon long exposure to light and air it acquires a reddish tint, and should, therefore, be kept in small, dark, amber-colored, well-stoppered vials, and in a dark place. Soluble in water and boiling water and alcohol. *Dose*, 1/100 to 1/40 grain. Solutions for ocular use, 1 to 2 grains to the ounce of distilled water; a few drops of which are to be instilled until the desired effect is produced.

Specific Indications.—Locally, to induce contraction of the pupil in mydriasis or injuries to the eye; corneal ulcers, iridal prolapse. Internally, strychnine, belladonna and atropine poisoning; meteorism; intestinal stasis from post-operative paresis.

Action.—(See *Physostigma.*)

Therapy.—*External.* Physostigmine salts, usually spoken of by ophthalmologists as "eserine salts", are the universally used myotics. While the sulphate is the most soluble, it deliquesces easily, and the salicylate is usually preferred. Solutions should be prepared as needed, as they readily decompose. Applied to the conjunctiva, solutions of eserine salts occasion transient smarting and lachrimation, followed shortly by contraction of the pupils, an effect lasting several hours. Use of the eye for accommodation occasions severe pain.

Physostigmine salicylate is the best local agent to reduce intraocular tension, overcome mydriasis, and improve the accommodative power of the eye for distant vision. It is used when for any reason it is desired to counteract the mydriasis from atropine or other causes, though it is less powerful as a myotic than atropine is strong as a mydriatic. Therefore full doses must be used. It is the remedy to reduce intraocular tension in the early stages of glaucoma. Where alternate contraction and dilatation to prevent adhesions are required, it may be used to fulfill the first indication. It is especially valuable to control excessive ocular tension after injuries to the eye, in peripheral or sclero-marginal ulceration of the cornea, particularly when non-vascular and the recuperative powers are feeble,

and in prolapse of the iris, and in hypopyon ulcers. Persistent spasm of the muscles of accommodation are overcome by it, and it is sometimes used to control neuralgic pains in the eyeball. In corneal ulcerations, in the absence of iritis, it is sometimes more effectual than atropine.

Internal. (See also *Physostigma.*) Internally or hypodermatically administered physostigmine salicylate (or sulphate or hydrobromide) may be used after operations where the bowels fail to move on account of intestinal paresis and in meteorism. The dose should be large, about 1/30 grain, given with 1/30 grain of strychnine sulphate or nitrate. It is also used for the relief of intestinal and gastric dilatation, with accummulation of gas and feces, as well as in catarrhal states of the tubular organs composed of non-striated muscular tissue. For this purpose it has been used in humoral or bronchial asthma, chronic bronchitis with dilated musculature and difficulty in expelling mucus, and for the same purpose in emphysema. King advised physostigmine in sexual impotence with premature ejaculation upon attempting coitus. Eserine salts are frequently prescribed for colliquative sweating as in the night sweats of phthisis. When difficult expectoration is concomitant the careful use of the drug is justifiable, but for hyperhidrosis alone we have better agents. Physostigmine is antagonistic to atropine and has, therefore, been suggested as an antidote in belladonna or atropine poisoning.

PHYTOLACCA.

The recently dried root and fruit of *Phytolacca decandra*, Linné (Nat. Ord. Phytolaccaceæ). North America, along roadsides and fences, and in clearings and uncultivated fields; grows also in northern Africa, southern Europe, China, the Azores, and Sandwich Islands. *Dose*, 1 to 20 grains.

Common Names: Poke, Poke-root, Poke Weed, Garget, etc.

Principal Constituents.—*Root:* A remarkably large amount of potassium, a body closely resembling *saponin*, and the alkaloid *phytolaccine*. *Berries:* A purplish-red powder (the coloring body), indifferent phytolaccin, and phytolaccic acid.

Preparations.—1. *Specific Medicine Phytolacca.* (Prepared from the root.) *Dose*, 1 to 20 drops. (*Usual form of administration:* ℞ Specific Medicine Phytolacca, gtt. x to xxx; Water, fl℥iv. Mix. Sig.: One teaspoonful every one, two or three hours.

2. *Tinctura Phytolaccæ Recentium*, Green Tincture of Phytolacca. (Fresh, recently dried root, ℥viij; Alcohol (76 per cent), Oj.) *Dose*, 1 to 30 drops.

Specific Indications.—Pallid mucous tissues with ulceration; sore mouth, with small blisters on buccal mucous surfaces and tongue; sore lips, pallid and with separated epidermis; fauces full and mucous surfaces pallid, sometimes livid, with swollen tonsils and whitish or ashen-gray tenacious exudate; aphthæ; imperfect glandular secretion; faucial, tonsillar or pharyngeal ulceration; secretions of mouth impart a white glaze over mucous membranes and tongue; white pultaceous sloughs at angles of mouth or lining the cheeks; hard painful glandular enlargements; pallid sore throat with cough and difficult respiration; mastitis; orchitis; parotitis; soreness and swelling of mammary glands; diphtheroidal sore throat; and fatty degeneration.

Action.—Physiologically, phytolacca acts upon the skin, the glandular structures, especially those of the mouth, throat, sexual system, and very markedly upon the mammary glands; also upon the fibrous and serous

tissues, and mucous membranes of the digestive and urinary tracts. It is principally eliminated by the kidneys. Applied to the skin, either in the form of juice, strong decoction, or poultice of the root, it produces an erythematous, sometimes pustular, eruption. The powdered root when inhaled is very irritating to the respiratory passages, and often produces a severe coryza, with headache and prostration, pain in chest, back, and abdomen, conjunctival injection and ocular irritation, and occasionally causes violent emeto-catharsis. Upon the gastro-intestinal tract doses of from 10 to 30 grains of it act as an emetic and drastic cathartic, producing nausea which comes on slowly, amounting almost to anguish, finally after an hour or so resulting in emesis. It then continues to act upon the bowels, the purging being prolonged for a considerable length of time. It is seldom used for emeto-cathartic purposes, on account of its tardy action, which, when established, continues for some time. It rarely causes cramps or pain. Large doses produce powerful emeto-catharsis, with loss of muscular power —occasionally spasmodic action takes place, and frequently a tingling or prickling sensation over the whole surface. Dimness of vision, diplopia, vertigo, and drowsiness are occasioned by large doses not sufficient to produce death. Phytolacca slows the heart's action, reduces the force of the pulse, and lessens the respiratory movements. It is a paralyzer of the spinal cord, acting principally on the medulla. In poisoning by this agent tetanic convulsions may ensue. Death results from carbonic acid poisoning, the result of respiratory paralysis.

The treatment of poisoning by phytolacca is that of gastro-enteritis.

Therapy.—*External.* A poultice of poke root has given relief to felons and mammary inflammation. If used early resolution may take place; if suppuration occurs it will hasten that process. Locke advised the specific medicine with glycerin (fl℥ij to fl℥j) for external use in mammitis. The same preparation occasionally heals sore nipples, and an ointment has been used successfully in scaly forms of eczema, in glandular engorgement, and may give relief in some cases of hemorrhoids, and in goitre. In most instances its local use should be accompanied by its internal exhibition.

Internal. Medicines which act directly upon the glandular structures are not numerous. Among those that do so act, none is more direct than phytolacca. Phytolacca belongs to that class of remedies which is denominated alteratives. Whether such terms as the latter are justifiable in the light of present-day progress may be open to question. The experience of many years with phytolacca with success in what has been understood to be alterative effects, is a matter of Eclectic record. That it powerfully impresses the glands of the skin, lymphatic system, buccal, faucial, nasal, and sexual systems, and particularly the tonsils, ovaries, testicles, and mammary glands, we are well satisfied. The periosteal and other fibrous tissues are also acted upon by it, and there is no doubt but that it has more or less influence over the deposition of fats, its favorable action in *fatty degeneration of the heart* entitling it to consideration.

Phytolacca is pre-eminently a remedy for swollen or engorged glands and adenitis. It is of undeniable value in conditions which might be conveniently classed as the dyscrasias—scrofulous, syphilitic, and rheumatic. It is not a direct antisyphilitic in the sense that it will destroy treponema,

but for the train of ills due to the ravages of that disease as shown in the glandular and skin involvement it is among the most useful of drugs. When ulcerations result from the same cause it is particularly effective. It has long been used in various mixtures designed as antisyphilitics, which are, of course, but general alteratives. In those vague conditions, with pain and swellings at the joints, probably arthritic, and associated with swellings of the lymph glands, passing current under the elastic name of chronic rheumatism, phytolacca has acted most satisfactorily. It is, however, of little or no value in acute articular rheumatism.

Without phytolacca we should be at a loss to know how to treat glandular affections undergoing swelling or inflammation. Its most direct indication is *hard*, painful enlargement of the glands with associated pallid mucous membranes. It is not so direct a remedy for suppurating glands. It is of signal value in mumps, and inflammation of cervical, axillary, and inguinal glands, when not due to tuberculosis. Even then its influence is often shown by its power to reduce the glands more or less, but exceedingly slowly; while in those enlargements due to syphilis its effects are more prompt and decided. Its beneficial control over tonsillitis and swelling of the submaxillary glands is well known. In acute mastitis phytolacca is by far our best remedy, and its action is hastened by its conjoint administration with aconite and bryonia. This treatment, with mechanical support, gentle withdrawal of the milk, if possible, or sometimes strapping of the gland with adhesive plaster may avert suppuration. After surgical measures for the liberation of pus the use of phytolacca should be continued to reduce any remaining engorgement of the organ. Sore nipples and mammary tenderness, and morbid sensitiveness of the breasts during menstruation are relieved by phytolacca, and it is decidedly useful in the mammary swelling which sometimes occurs in infants.

Though its action upon the reproductive glands is less decided than upon other specialized glands and upon the lymphatic nodes, it is not without value sometimes in orchitis and ovaritis. It is most effectual in the former when the inflammation is occasioned by the metastasis of mumps. Phytolacca has aided in the reduction of goitre, but ordinarily it is little to be relied upon for that purpose; iris is more effective, and that fails far oftener than it succeeds, except in the soft varieties.

Phytolacca is important in dermatological practice. It destroys the "itch" insect, consequently it is of value in scabies, though it is by no means as effectual as sulphur. The condition which calls for it internally in skin diseases is one of indolent action of the skin, usually associated with vitiated blood and hard glandular enlargements. There may be scaly, vesicular, pustular, or tuberculous eruptions, and lymphatic enlargements with pain. The skin may be inflamed, but does not itch because there is not activity enough in the part. It is often indicated in chronic eczema, syphilitic eruptions, psoriasis, tinea capitis, favus, and varicose and other ulcers of the leg. Associated with iris, it is a valuable agent in fissures, boils, carbuncles, dermal abscesses, and ulcerations of the outlets of the body. For skin diseases it should be employed internally and locally. ℞ Specific Medicine Phytolacca, fℨss; Water, fℨiv. Sig.: Teaspoonful every three hours. Locally: ℞ Specific Medicine Phytolacca, fℨij; Glycerin, fℨj. Mix. Apply.

Phytolacca is useful in acute and chronic mucous affections, as in tracheitis, laryngitis, chronic catarrh, and especially in those affections where there is a tendency to the formation of false membrane. There is a pallid, somewhat leaden-colored tongue, with but little coating, being a slick, glutinous coat, if covered at all. The mucous membranes present whitish erosions, or vesicular patches. With these conditions it may be employed in follicular tonsillitis, follicular pharyngitis, stomatitis, aphthæ, nursing sore mouth, or ordinary sore mouth, and syphilitic faucial ulcerations. It should be taken internally and used locally as a wash. It is one of our most valuable agents in sore throats resembling diphtheria, but is not curative in genuine diphtheria showing the presence of the Klebs-Leoffler bacillus. It may be and should be used conjointly with antidiphtheritic measures, however, to stimulate the mucous membranes, promote glandular activity and assist in loosening the membrane. Phytolacca acquired a reputation at one time as a positive remedy for diphtheria. That was before the presence of the bacillus was determinable by laboratory methods. It is largely possible that many border-line cases were then called diphtheria, as some streptoccoccic inflammations are now until bacteriological investigations prove otherwise. Even in true malignant types its use was an improvement over old-time treatment and the claims of those who advocated it for diphtheria were reasonably just. But time has clarified the situation, and now we use it as a valuable auxiliary remedy for sore throat with exudation.

Phytolacca has been suggested to prevent and to cure gastric ulcer, and the suggestion seems fairly reasonable provided the general specific indications are observed, and the case is one long preceded by debility and catarrhal hypersecretion. It has relieved headache due to gastric acidity. Its usefulness in nephritis with the voiding of albuminous urine is open to question, if not exceedingly doubtful, and the reputation of an extract of the juice of the berries for the reduction of obesity has not been sustained. Single results from the use of any remedy in any of the difficultly curable diseases do not justify the too common practice of asserting its wholesale utility for such disorders. We prefer a tincture prepared from the freshly dried root for internal administration.

PICROTOXINUM.

Picrotoxin. (Formula: $C_{30}H_{34}O_{13}$.)

A neutral principle obtained from the seed of *Anamirta paniculata*, Colebrooke (Nat. Ord. Menispermaceæ), and probably other species of Cocculus. Climbing plant of Malabar, the Eastern Islands, etc., of the East Indies.

Description.—Colorless, flexible, glistening, prismatic crystals, or a micro-crystalline powder, permanent, odorless, and having a very bitter taste. Sparingly soluble in water, more readily in boiling water, and freely in alcohol; very slightly dissolved by ether or chloroform. *Dose*, 1/150 to 1/64 grain.

Action.—The dominant action of cocculus and its neutral principle is upon the medullary centers of respiration, circulation, and vaso-motor control, causing accelerated breathing, slowing of the pulse, and also causing cardiac palpitation and marked rise in arterial pressure. All the secretions are increased by picrotoxin; and nausea, vomiting, and gastro-intestinal irritation follow its use. Toxic and even fatal results have come from

eating but few of the berries, and similar results have resulted from absorption of the poison from the application of the ointment to abraded surfaces. Dizziness, twitching of the muscles, trembling, alternate clonic and tonic convulsions, insensibility and coma ensue from poisonous doses; death, while the victim is still unconscious, takes place through respiratory paralysis.

In the treatment of poisoning by cocculus and picrotoxin give an emetic, administer anticonvulsives, as chloroform and chloral, apply heat, and inject cardiac stimulants, such as ether, alcohol, ammonia, and digitalis.

Therapy.—*External.* Picrotoxin is a parasiticide of great power, destroying both animal and vegetable parasites. An ointment of 1 grain of picrotoxin and 100 grains of benzoinated lard may be cautiously used to destroy the head louse (pediculus capitis) and the itch mite (acarus scabei) and to relieve trichophytosis, tinea versicolor and porrigo scutulata, and other parasitic affections. *It should not be used on abraded or open surfaces,* nor in any abundance, lest poisoning should occur. (See also *Cocculus.*)

Internal. No longer is picrotoxin used for spasmodic diseases. Sometimes it alleviates menstrual headache of the migraine type and relieves nervous dysmenorrhœa if given a couple of days before the flow is expected. Its chief use is to restrain colliquative sweating, especially the night sweats of phthisis. Though a slower anhydrotic than atropine it does not cause the disagreeable throat and skin dryness produced by the latter, and often succeeds when that alkaloid fails. The dose for this purpose is about 1/100 grain. Fearn used the 3x trituration in doses of 2 grains. Others advise similar doses every two hours during the evening, or a single dose of picrotoxin (1/100 grain) for three or four days. Its influence when once established is said to last from ten to fourteen days.

PILOCARPUS.

The dried leaflets of (1) *Pilocarpus Jaborandi*, Holmes; or (2) *Pilocarpus microphyllus*, Stapf (Nat. Ord. Rutaceæ). Brazil and Paraguay. *Dose*, 20 to 60 grains.

Common Names: Jaborandi, (1) Pernambuco Jaborandi, (2) Maranham Jaborandi.

Principal Constituents.—The powerful liquid alkaloid *pilocarpine* ($C_{11}H_{16}N_2O_2$); a colorless, viscid oil, isopilocarpine; a volatile oil chiefly pilocarpene ($C_{10}H_{16}$); and pilocarpidine ($C_{10}H_{14}N_2O_2$) in Pilocarpus Jaborandi only.

Preparation.—*Specific Medicine Jaborandi. Dose*, 1 to 60 drops.

Derivatives.—*Pilocarpinæ Hydrochloridum*, Pilocarpine Hydrochloride. Translucent, colorless and odorless crystals of a feebly bitter taste; hygroscopic in the air. Very soluble in water and alcohol, less soluble in chloroform, and not at all in ether. *Dose*, 1/12 to 1/6 grain by mouth; 1/24 to 1/8 grain (hypodermatically).

Pilocarpinæ Nitras, Pilocarpine Nitrate. Permanent, shining, odorless crystals, very soluble in water and less so in alcohol; insoluble in chloroform and ether. *Dose*, 1/12 to 1/4 grain (by mouth); 1/24 to 1/8 grain (hypodermatically).

Specific Indications.—Deficient secretion; marked dryness and heat of skin and mucosa; muscular pain; muscular spasms; pain with puffiness of tissues; urinal suppression, the urine being of high specific gravity and deep color; pulse full, hard, sharp and strong, with deficient secretion; increased temperature with dry skin and membranes; sthenic forms of fever; marked restlessness due to lack of secretion; ptyalism, with stomatitis; inflammatory rheumatism, with swollen and painful parts, and dry membranes and skin; soreness and stiffness of joints in subacute rheumatism; dry, harsh cough; tenacious sputum; renal dropsy with deficiency of urine;

uræmia; uræmic poisoning, with convulsions; itching, with jaundice; increased ocular tension; deafness due to deficient aural secretion; alopecia; poisoning by atropine or belladonna; colliquative sweating (minute dose).

Action and Toxicology.—Jaborandi and its alkaloid, pilocarpine, are the most powerful excitants of the secretions of the peripheral secretory glands known. In full doses they cause an enormous outpouring of sweat and saliva, and to a lesser degree stimulate the lachrymal, nasal, faucial, and bronchial secretory apparatus, and to a still lesser extent those of the stomach and intestines. Even the modified secretory organs of the aural canal are indirectly affected by them and the quantity of cerumen increased. The growth of hair and intensification of its color are stimulated by their internal action as well as when locally applied. By most pharmacologists the effect of these drugs upon peripheral secretion is attributed to the direct action upon the terminals of the peripheral nerves and not to any impression *per se* upon the epithelial secretory cells. This they prove by completely checking them with atropine, known to act upon the same parts but in exactly an opposite manner. Cushny declares that both act upon an intermediary receptor interposed between the nerve and cells at the myo-cellular junction, and that neither the nerve nor the cells are directly impressed. These bodies are stimulated by pilocarpine and muscarine (agaricine) and depressed or paralyzed by atropine. It is generally conceded that while atropine is the complete antagonist of pilocarpine, which chiefly acts in the manner described and to a very limited extent upon the central nervous system, on the other hand pilocarpine is, therefore, not a complete antagonist of atropine. The action of pilocarpine upon the involuntary muscles is caused in the same manner as upon the sudoriferous glands—by impressing the myo-neural receptors.

Moderate doses of these drugs have scarcely any effect upon the central nervous system, and pilocarpine is less apt than jaborandi to cause gastric and intestinal discomfort. Both, however, appear to increase peristalsis and in full doses may cause a persistent watery diarrhœa, with straining or tormina after the diarrhœa ceases. Upon the eye myosis is produced by both the local and internal use of them, and spasm of the accommodation also occurs. In large doses they are cardiac depressants, probably affecting the heart muscle and to some degree vagal inhibition. The extent to which the vaso-motor system participates in first causing increased and then lowered blood pressure is not satisfactorily known. Full doses cause cardiac arrythmia, and increase the number of heart-beats greatly, but render them weaker. The uterus, spleen, and bronchi contract under the influence of these drugs. Temperature, though at first considerably increased, falls when sweating has become well established. This action is more marked during fevers than in health. After the termination of sweating temperature regains its normal status, usually at once, but is sometimes delayed for several hours. As a rule, the secretion of milk is believed to be unaffected by pilocarpine, but contrary to what might be anticipated, where there is a diminished lacteal secretion, it apparently increases the supply.

One or two drachms of powdered jaborandi infused in a cupful of boiling water and taken at one dose will in about ten to twenty minutes cause

a tingling of the skin with marked redness of the surface. This sensation is first experienced in the face, but soon extends to the whole surface of the body, and is quickly followed by an abundant perspiration, which is apt to last for four or five hours. Almost simultaneously with the sweating the secretion of saliva increases to such an extent as to greatly embarrass speech, the person being obliged to assume an inclined position that the escape of saliva may be facilitated. During this stage from one to two pints of saliva and even more may be secreted, and usually there will be in addition an augmentation of the bronchial and lachrimal flow. The saliva contains an abundance of ptyalin and salts and readily converts starch into sugar. At times the mucous glands of the intestines are so stimulated and peristalsis so increased as to cause diarrhœa, and it is not a rare circumstance that the submaxillary glands enlarge and become painful. Nausea and vomiting (less likely with pilocarpine), vertigo, hiccough, heaviness of the head, and contraction of the pupils may take place. From the commencement of perspiration the face becomes pale, the pulse temporarily fuller and more frequent; the pulsations become irregular, and with persons laboring under cardiac affections, a kind of asystole is observed. The effects of these drugs occur more readily in adults than in children, the latter in fact standing their action much better than adults. In using these medicines to produce diaphoresis it is not necessary to use warm drinks or other usual aids toward facilitating the sweating. During the sudorific action of jaborandi the quantity of urine is lessened, to a greater or lesser extent, and micturition frequently proves painful. As urea exists to a large extent in the saliva and sweat caused by jaborandi (no uric acid being found), a diminution of it occurs in the urine voided; but, after sweating, it gradually returns to its normal figure in the urine. It would appear that the drug does not increase combustion in the body. Dryness of the mouth and throat, with a sense of fatigue and depression, most usually follows the cessation of its active effects. Administered in divided doses, jaborandi, instead of acting as a diaphoretic and sialagogue, becomes an active diuretic. The conclusions then are that jaborandi and its alkaloid exert a strong special influence upon the sudoriferous and salivary glands, and (in small doses) upon the renal glomerules, which stimulates their functional activity.

Pilocarpine, the active principle of jaborandi, has an action nearly identical; however, it causes less salivation, less vomiting, and is more certain in its effects. The hydrochloride and the nitrate of this alkaloid are used; they may be employed internally, or by subcutaneous injections. In poisoning by jaborandi or pilocarpine, death is not apt to result except where an existing grave cardiac disease renders the patient a victim to exhaustion. Atropine is the physiologic antagonist to its sudoriferous and muscular effects; morphine overcomes the nausea and diarrhœa and pain; strychnine, caffeine and digitalis may be required to support the heart.

Therapy.—*External.* Externally applied pilocarpus and pilocarpine are accredited with the rather singular effect of causing the hair to become darker in color, and to stimulate the growth of that appendage it is frequently employed in alopecia. The specific medicine, fluidextract, or the alkaloid, may be used in lotions with soap liniment and cologne; or the latter, with

or without cantharides, may be incorporated with a lanolin base. The specific medicine may be applied in dry eczema, and to allay inflammation in erysipelas, mumps, mastitis, orchitis, epididymitis, and swollen and painful joints. Pilocarpine, being a strong myotic, is coming to be preferred to physostigmine (eserine) in eye affections, though acting slower and less profoundly than the latter, but with less irritation. In fact, it is a most valuable myotic in all conditions of the eye in which there is increased intraocular pressure. Locally used pilocarpine lessens pain from excessive use of the eyes, and alleviates congestive conditions. By some it is preferred to eserine in glaucoma. After traumatism, with increased ocular tension, the latter as well as pain is relieved by the local use of pilocarpine hydrochloride. Instilled in the eye it is also useful in keratitis and phlyctenular conjunctivitis, both in the early stage.

Internal. Jaborandi is diaphoretic, sialagogue, myotic, sedative, diuretic and antispasmodic, according to the manner of employing it. The keynote to its therapy is arrest of secretion whether it be of the glands of the skin, the glands of special ferments, or the glands of the mucous tracts. Oversecretion due to weakness of the glands is also corrected by it, and the debilitating or unhealthful outpour controlled. In other words, like many other drugs having a single though apparently a double action, it tends to stimulate normal secretion by correcting faulty functioning as manifested in either deficiency or hypersecretion. It is also of value in the early stage of acute inflammations, particularly of the skin, respiratory organs, and in acute rheumatism. When given too freely in the latter it may produce vomiting and excessive sweating. Then it should be discontinued. As the regulation of abnormal secretion has ever been a cardinal feature of Eclectic therapeutics, the adoption of pilocarpus has given us a remedy capable of great good, but one which, on account of its depressing action on the heart and the debility occasioned by excessive diaphoresis, must be used with judgment and care.

Pilocarpus was once used for many purposes for which it is now discarded. Among these were dropsies of various origin. At the present day its eliminative powers are sought only in dropsy of renal origin, not to cure the disease producing it, but to unburden the system of watery accumulation and to some extent of poisonous and convulsive irritants. Occasionally it is used in the attempt to remove pleural effusions, but other agents are better. Owing to its depressing action upon the heart and the danger of inducing pulmonary œdema it should not be employed in dropsies of cardiac origin. Such deaths as have occurred from pilocarpus and its alkaloid have been caused by these two accidents. While it is generally advised that it is safe in the early stages of acute Bright's disease, most clinicians are extremely cautious or do not use it at all in chronic parenchymatous nephritis nor in any advanced form of nephritis, especially in those past middle life. Pilocarpine is the one great theoretical and apparently practical drug for uræmic convulsions, relieving the kidneys of their burden by placing it upon the skin, whereby a large amount of fluid together with urea and toxins are eliminated. In this condition it is expedient to quicken its action by hot drinks, heat to the surface of the body, and the aid of enveloping blankets. One-twelfth to one-sixth grain of pilocarpine nitrate may be given hypodermatically.

Since these earlier and still established uses for pilocarpus the drug has come into prominence in Eclectic practice chiefly through the writings of Webster, Ketchum, and Foltz. Added to its diuretic and sudorific qualities, jaborandi is sedative and antispasmodic, many preferring it to veratrum for the former purpose, and to lobelia or gelsemium for the latter. The indications for this drug, specifically considered, may be summed up as follows: It is a remedy for sthenic conditions, and must be avoided, or its use carefully guarded, in weakened conditions of the heart. Jaborandi is efficient in disorders exhibiting a dry, hot skin, with febrile reaction, especially when accompanied by acute suppression of the secretions; dry, parched mouth; full, strong, hard, and sharp pulse; deficient renal activity with deep-red urine, scanty in quantity and of high specific gravity; restlessness, and, with any of these symptoms, pain. Jaborandi is claimed by Webster to be adapted to almost any febrile or inflammatory condition, sthenic or asthenic, with or without a dry skin. Most observers, however, prefer to limit its use to sthenic conditions only.

As a remedy for pain and inflammation jaborandi has been highly endorsed in mammitis, with dry skin and suppressed lacteal secretion, in acute articular inflammation and acute articular rheumatism, the joint being extremely painful and swollen. In erysipelas with dry skin and elevation of temperature it is especially valued, and is also locally applied. Webster declares that in cerebro-spinal meningitis it has no equal. This view has not been universally endorsed. In rheumatic affections its value is enhanced by its power to eliminate urea and uric acid from the system. Jaborandi is indicated by stiffness, soreness, and swelling of the joints, whether the parts show redness or pallor. Many declare it one of the most important agents to use in the early stage of acute inflammatory rheumatism. One of its chief indications in such disorders is puffiness of the tissues. Its action should not be carried to extremes, however, and the ever-present danger of cardiac depression should be kept in mind. Jaborandi has proved a useful drug in exanthematous diseases with tardy appearance or tendency to retrocession of the eruption, and by this action has been thought to avert the danger of post-scarlatinal dropsy. For acute (preferably) or chronic muscular pain, pleurodynia, lumbago, and muscular spasm, it sometimes proves a most efficient drug. The specific indications must, of course, be observed.

Jaborandi is recommended for cough when the throat is very dry and secretion checked. It is well recommended in bronchial asthma and whooping-cough with dryness of the respiratory passages. Small doses relieve "winter cough," and the cough of chronic bronchitis with lack of secretion, and dry, irritable, hoarse cough. In the early stage of bronchitis, and in the congestive stage of pneumonia, it rapidly relieves the local inflammation, and reduces the fever if it be given in diaphoretic doses. Some employ it in the attempt to abort acute lobar and lobular pneumonias, and sometimes it is effective at least in limiting the damage done by a violent sudden invasion. Here again the caution concerning the heart depression and the danger of pulmonic œdema must be remembered, and the drug used with extreme good judgment. In respiratory troubles it does best service when associated with other indicated remedies, as bryonia, asclepias,

lobelia, etc. In acute tonsillitis with secretion of tenacious pharyngeal mucus it serves an excellent purpose. Foltz valued it highly in pharyngitis sicca. When exudation has taken place in pleurisy, jaborandi is one of the best agents to effect the removal of the fluid and promote resolution. Some value it to increase secretory activity. It finds also a place in the treatment of dry croup and laryngismus stridulus. In laryngeal diphtheria (so-called membranous croup), if the child is strong, jaborandi may be administered in doses sufficient to increase the secretions of the throat, and thus loosen the false membranes. Many, however, cannot stand its action, and only in the sthenic cases, and never in the debilitated, should it be attempted. The well-known toxic effect of diphtheria in inducing cardiac and vaso-motor paralysis renders the use of any possible circulatory depressant inadvisable. And this is true of jaborandi in the doses necessary to induce free secretion.

Jaborandi has given good service in metastatic and gonorrhœal orchitis, ovaritis, and metritis, the specific indications for it being present. Both internally and locally it sometimes alleviates in parotitis (mumps).

Jaborandi is one of the most useful of agents in properly selected cases of la grippe or epidemic influenza, and of catarrhal fever. In fact the drug acts admirably as a non-stimulating diaphoretic and sedative in many inflammatory and febrile conditions, provided the stomach is not too irritable to retain the medicine. It is sometimes used like gelsemium to prepare the system for the kindly action of quinine in intermittent fevers. It should never be used in adynamic fevers, such as typhoid fever.

Small doses of pilocarpus restrain excessive secretion. This is well exhibited in its successful use in controlling some cases of polyuria (diabetes insipidus), colliquative night sweats, and ptyalism and the consequent aphthous stomatitis induced by the latter. In the first named its action is enhanced by ergot.

Acting upon the theory that the act of parturition is favored by free diaphoresis, jaborandi and its alkaloid have been successfully used in cases of tedious labor due to a rigid, hard os uteri. In these cases the pains are severe yet ineffectual, the skin dry, pulse full, sharp, and hard, and there is some febrile reaction. These conditions are rectified by diaphoretic doses of the drug. They are, however, rarely employed for this purpose.

Rarely in diaphoretic doses, it may do good in the albuminuria of pregnancy.

Many skin disorders of a dry character appear to be benefited by the internal (and external) use of jaborandi. Among these are eczema, pruritus, particularly when occurring in a jaundiced skin, prurigo, hyperhydrosis pedum and psoriasis. (See also *External Uses*.)

The late Dr. Foltz was an enthusiastic advocate of the use of jaborandi in eye, ear, nose, and throat disorders, particularly where there is a lack of the natural secretions of these parts. Full doses of jaborandi contract the pupils, impair accommodation, diminish intraocular tension, and increase secretion. Locally applied, the action is similar, the effects upon the pupil, however, being much less pronounced when the drug is internally administered. Foltz praised it in rheumatic iritis, and for the absorption of "non-organized vitreous opacities". In iritis he always used it, and be-

lieved that it shortened the duration of the disease, and if adhesions were present, assisted in their absorption. Optic neuritis, retinal detachment, choroiditis, episcleritis, tobacco and alcoholic amblyopia, and atrophy of the optic nerve are also conditions in which he advised its use. Others have advised it in hemorrhages and plastic exudations of the retina, hemorrhage into the vitreous humor, floating bodies in the vitreous, glaucoma, and corneal opacities. For ocular affections Foltz advised as a dose from three to ten drops of specific medicine jaborandi, every two or three hours; and as a collyrium, one to two grains of pilocarpine hydrochloride to two fluidounces of water. In ear disorders jaborandi improves by increasing the secretions of the aural cavities and canals. Unhealthy cerumen is frequently restored to its natural condition by the continued use of small doses of jaborandi. Jaborandi is the best remedy in non-suppurative inflammation of the middle ear, of the proliferous type (Foltz), and it proves a good drug for nervous deafness, deafness following scarlet fever and diphtheria, and with appropriate adjunct specific treatment, in inner ear diseases of syphilitic origin (Foltz). The alkaloidal salts (1/3 to 1/6 grain subcutaneously) have been employed in these disorders, but the specific medicine jaborandi is to be preferred in doses of three to ten drops every three or four hours.

Pilocarpus and its alkaloidal salts have been used to counteract the poisonous effects of belladonna, atropine, stramonium, daturine, and poisonous bites or stings, and in ptomaine poisoning from canned fish and meats. In the latter instances it has no antidotal power, but favors elimination of the offending material. While failing to completely counteract the toxic effects of atropine, it nearly always relieves the unpleasant dryness of tissues following the use of that alkaloid or of belladonna.

Where depressing effects are produced by jaborandi, as sometimes occurs where there is valvular disease or fatty degeneration of the heart, or morbid pulmonic circulation, strychnine hypodermatically may sustain the heart-action. Digitalis, cactus, caffeine, or strophanthus may also be used. The profuse sweating may be checked by atropine. When pilocarpine acts like atropine, such effects are probably due to contaminating jaborine. In cases where the internal exhibition of jaborandi by mouth occasions nausea or vomiting, this may be avoided in giving the dose by rectal enema. Coffee is also said to prevent its nauseating effect.

The dose of jaborandi in infusion (45 grains to 2 fluidounces of water) is 1 fluidounce, which may, if necessary, be repeated every ten or fifteen minutes; of the fluidextract, from 10 drops to 1 drachm; of specific medicine jaborandi, 1 to 30 drops; of pilocarpine or its salts, internally, from 1/4 to 3/4 grain; by subcutaneous injection, 1/20 to 1/4 grain, in solution.

Pilocarpine.—The alkaloid pilocarpine is used in the forms of hydrochloride and nitrate in the same diseases as the infusion and alcoholic preparations of the leaves. The effects of the alkaloid are said to be more certain than when the leaves are used, and the tendency to nausea and vomiting is greatly diminished. Pilocarpine may be used in many of the aforementioned disorders, although jaborandi is generally preferred by the Eclectic physicians.

PIMENTA.

The nearly ripe fruit of *Pimenta officinalis*, Lindley (Nat. Ord. Myrtaceæ). South America and West Indies, particularly Jamaica. *Dose*, 10 to 30 grains.

Common Names: Allspice, Pimento, Jamaica Pepper.

Principal Constituents.—An essential oil (*Oleum Pimentæ*) and an aromatic green resin.

Preparation.—*Specific Medicine Pimenta. Dose*, 2 to 30 drops.

Action and Therapy.—A pungent, aromatic stimulant and carminative, but used chiefly as a flavoring agent. The oil, in doses of two to five drops, is sometimes given in flatulence and other conditions in which essential oils are usually displayed.

PIPER.

The unripe berries of *Piper nigrum*, Linné (Nat. Ord. Piperaceæ). East Indies. *Dose*, 1 to 15 grains.

Common Names: Pepper, Black Pepper.

Principal Constituents.—*Piperine* ($C_{17}H_{19}NO_3$); oil of pepper, the chief constituent of which is lævo-phellandrene; and the alkaloid *chavicine*.

Preparation.—*Tinctura Piperi*, Tincture of Pepper (℥viij to Alcohol, Oj). *Dose*, 1 to 30 drops.

Derivative.—*Piperinum*, Piperin. (A neutral principle derived from Pepper and allied plants.) *Dose*, 1 to 8 grains.

Specific Indications.—Gastric atony; congestive chills.

Action and Therapy.—Black pepper may be used as a corrigent of griping medicines. Combined with quinine it is frequently of service in intermittents, especially when congestive chill takes place. Piperin was once advised for the same purpose, but is less effective than the tincture of pepper; and even this frequently fails. Black pepper has carminative properties, and is useful in flatulence, and rarely may be used in gastric atony in those unaccustomed to the free use of pepper as a condiment.

PIPER METHYSTICUM.

The root of *Piper methysticum*, Forster (Nat. Ord. Piperaceæ). South Sea Islands. *Dose*, 5 to 60 grains.

Common Names: Kava-Kava, Ava, Ava-Pepper Shrub, Intoxicating Long Pepper.

Principal Constituents.—Starch (50 per cent), *methysticin* ($C_{15}H_{14}O_5$), the methyl ester of methysticic acid; *kavahin* (methylene protocatechuic aldehyde, identical with heliotropin or piperonal); and the chief active principle, an acrid resin (2 per cent) separable into the local anæsthetic *alpha-resin* and the less active *beta-resin*.

Preparation.—*Specific Medicine Piper Methysticum. Dose*, 5 to 60 drops.

Specific Indications.—Irritation, inflammation, or debility of the urinary passages; chronic catarrhal inflammations; vesical irritation and inflammation; vesical atony; painful micturition, strangury, and dysuria; gonorrhœa, slow and intractable; gleet; anorexia; gastric atony; pale and œdematous tissues, with scanty or irregular flow of urine, and indisposition to exertion; dizziness and despondency; neuralgia, idiopathic or reflex.

Action.—Piper Methysticum stimulates the salivary but not the cutaneous glands, and strongly excites the kidneys to watery diuresis, proportionately less solid material being voided in the urine. Upon the stomach it acts much like the stimulant bitters, increasing the appetite, and produces neither diarrhœa nor dysentery. The central nervous system is stimulated by it to a species of intoxication, somewhat resembling but

differing, however, from that caused by ethylic inebriation. Large doses will cause a drowsy and reserved intoxication, with confused dreams. The taste being agreeable, it is said one easily becomes a proselyte to its seductive qualities. The intoxicating drink prepared from it by the natives of certain Pacific islands induces an intoxication of a reserved drowsy character attended with confused dreams. Its long-continued use by them has caused more or less obscuration of vision and a dry, cracked, scaly and ulcerated skin, and lesions closely allied to leprosy.

Therapy.—Piper methysticum, "the intoxicating long pepper", is not an old medicine, though under the name of kava-kava and closely similar appellations it has been used in the preparation of a disgusting ceremonial drink among certain South Sea Islanders from early times. As a medicine it has the fourfold quality of being stimulant, sialagogue, tonic, and anæsthetic. Its field of action is upon the sensory nerves and mucous tracts of the body, more especially those of the genito-urinal and gastro-intestinal tubes.

Piper methysticum is an appetizer and tonic to the gastro-intestinal organs, this influence being especially marked when associated with urinary disorders. The patient is pale, the urinary product inconstant in quality; the tissues, especially of feet and legs, are œdematous; patient is indisposed to exertion, and has the general appearance of one with Bright's disease, yet there is no albumen nor evidence of any particular disease. Such symptoms clear up quickly under this remedy, and the appetite is quickly restored. Piper methysticum augments digestion and promotes better assimilation. The glandular activity of the digestive tract is increased, natural secretion and excretion favored, constipation is overcome, and hemorrhoids, if present, are reduced. It also exerts a marked curative influence in chronic intestinal catarrh.

The best known remedial action of this drug is upon the genito-urinal tract, in which, through presumably decreasing the blood supply by contracting the capillaries, it allays irritation with its consequent pain in urination, difficult micturition, and inflammation with discharges of mucus or muco-pus. Its reputation as a blennostatic in gonorrhœa is well sustained, but, as with all remedies, the specific condition must be present for its best results. It relieves in that form of acute gonorrhœa which is sluggish, tardy in responding to treatment, and tending toward the establishment of gleet. It is also a good agent in gleet. In the more acute cases it favorably assists the action of gelsemium, belladonna, and macrotys; while if there is marked debility it may be given with nux vomica or strychnine. Piper methysticum increases the power to urinate and, through its anæsthetic qualities, alleviates pain in the bladder and urethra, hence its value in debilitated and irritated conditions of those organs. It thus becomes an effective remedy sometimes in dysuria, painful micturition, strangury, chronic inflammation of the neck of the bladder, acute urethritis, nocturnal enuresis of old and young when due to muscular atony, and old feeble cases of catarrh of the bladder. It is also of some value in acute vaginitis, chronic bronchitis, rheumatism, and dropsy due to renal inefficiency.

Piper methysticum is a remedy for neuralgic pain, especially of the branches of the 5th nerve. It sometimes relieves ocular and aural neuralgia, toothache when not due to dental caries, neuralgia of the stomach and intestines, and neuralgic and spasmodic dysmenorrhœa. Such reflex neuralgias as abdominal neuroses due to prostatic, urethral, or testicular diseases, or pectoral neuralgia arising reflexly from nervous dyspepsia are cases for the exhibition of Piper methysticum.

PIPERAZINUM.

Piperazine. (Formula: $C_4H_{10}N_2$.)

Description.—Crystalline, colorless masses, or lustrous, glass-like tabular crystals; very deliquescent and absorbs carbon dioxide from the air. It has no distinct taste and is soluble in water and less so in alcohol. *Dose*, 3 to 5 grains.

Action and Therapy.—Piperazine forms, theoretically, piperazine urate in the body, and as this compound is very soluble and readily eliminated it has been claimed that piperazine is a remedy for the uric acid diathesis. As such it is advised to prevent the formation of renal and vesical calculi, especially phosphatic and oxalic concretions. It should be administered largely diluted, or given in carbonated water, in doses of three to five grains, every three to five hours. When there is a persistent oversecretion of uric acid, in a scanty flow of urine with high specific gravity, brick-dust deposits, and dry skin, muscular aching, and nauseous headache, the drug may prove useful in acute articular rheumatism and in rheumatoid arthritis, and troubles hinging on these conditions, as rheumatic pericarditis. It has also been used in pyelitis.

Lycetol (Dimethylpiperazine tartrate) is similarly used in lithæmic states. It is more permanent than the former. *Dose*, 15 to 30 grains a day, well diluted.

PISCIDIA.

The bark of the root of *Piscidia Erythrina*, Jacquin (Nat. Ord. Leguminosæ). West Indies and rarely in Florida. *Dose*, 5 to 60 grains.

Common Name: Jamaica Dogwood.

Principal Constituent.—The chief active body is *piscidin* ($C_{29}H_{24}O_8$), a neutral principle.

Preparation.—*Fluidextractum Piscidiæ*, Fluidextract of Piscidia. *Dose*, 10 to 60 drops.

Specific Indications.—Insomnia and nervous unrest; spasm, pain, and nervous irritability; migraine, neuralgia.

Action and Toxicology.—Jamaica dogwood controls pain and produces sleep by its narcotic action. It increases salivary and cutaneous secretion, slows the pulse, first increases then lowers arterial tension (due to the heart weakening), dilates the pupils, reduces reflex activity, may induce convulsions, and proves narcotic to man and animals. Nausea, vomiting, and convulsions have followed a half-drachm dose of the fluidextract. Death, in animals, is caused by either heart failure or respiratory paralysis.

Therapy.—*External.* Reputed to relieve toothache due to exposed dental pulp, alveolar abscess, or peridental inflammation, and has been advised locally for the relief of pain in hemorrhoids.

Internally. Jamaica dogwood is used to relieve pain, overcome spasm, allay nervous excitability, and produce sleep. It may be cautiously used

in the insomnia of the aged and in those of an excessively nervous temperament. By many it is advised where opium would be used to control pain, but for any good reason is not desirable—in neuralgias, painful spasms, tic-douloureux, sciatica, enteralgia, dysmenorrhœa, and the pains of fractures and carcinoma. It has aided some cases of spasmodic and reflex cough. In whooping-cough, in which it has been advised, it should be used with great caution. Foltz advised it in neuralgia of the eyeball and in supra-orbital neuralgia, and others speak well of results with it in inflammatory and painful affections of the eye and ear. It has never been used to a great extent by Eclectic physicians; and in children and the feeble it should be employed with caution on account of its tendency to produce convulsions, even though it may satisfactorily relieve pain.

PITUITRIN.

Pituitrin.

An extract of the fresh posterior lobe of the pituitary gland of animals.

Under this trade-name a pituitary extract has come into legitimate practice and the name is used here as a heading chiefly because it is the preparation most often mentioned in current medical literature. However, there are several good standardized proprietary preparations of a similar type—such as *Infundibulin*, *Hypophysin*, *Pituglandol*, etc., and the definite chemical *Hypophysin Sulphate*, all of which relatively have much the same action and effects. In order to have a definite standard the U. S. P. authorizes two forms of pituitary preparation—one dry, the other liquid. The latter and the various fluid pituitary extracts are very similar.

Preparations.—1. *Pituitrin* and those named above. *Dose*, 5 to 15 minims intramuscularly.

2. *Hypophysis Sicca* (U. S. P.), Dessicated Hypophysis. The cleaned, dried and powdered posterior lobe of the pituitary body of cattle. It is a non-crystalline, yellowish or greenish powder, of a peculiar odor, and is but partly dissolved by water. *Dose*, 1/4 to 1 grain (the usual dose being 1/2 grain).

3. *Liquor Hypophysis* (U. S. P.), Solution of the Hypophysis (Solution of the Pituitary Body). Contains the water-soluble principles of the fresh posterior lobe of the pituitary body of cattle. It is a clear, colorless or nearly colorless fluid, of a slight but characteristic odor. *Dose*, 5 to 20 minims (average dose, 15 minims).

Specific Indications.—To accelerate labor in simple uterine inertia, when there are no contraindications to a free and speedy delivery; in placenta prævia after dilation and rupture of membranes; post-partum hemorrhages when uterus is empty of everything but blood; shock; hypopituitarism.

Action.—Pituitrin (and other forms of pituitary extracts) acts upon muscular tissues of the involuntary varieties, causing strong contraction. This is most intense upon the uterine musculature, and in intestines, and to a considerable extent upon the heart-muscle and the peripheral arterioles. Apparently it has less effect upon the large vessel trunks, and on the kidney vessels it seems to have a dilating action. The effects of pituitrin, outside of increased diuresis, and possibly quickening of galactagogue power, are but little observed when the drug is given by mouth. It acts most powerfully when given intravenously, and next in force when administered subcutaneously. Very like adrenalin it raises blood pressure, but more slowly, and never abruptly and is maintained longer. Under its influence peristalsis is markedly increased and uterine contractions come on strongly within a few minutes, the relaxation between contractions being less perfect than normally. Its effects are not believed to be upon the nervous mechanism but upon the uterine muscle itself, and it appears to stimulate the organ

whether pregnancy exists or not. Pituitrin is mostly eliminated by the kidneys, which it usually stimulates to markedly increased diuresis. The latter action is as yet unexplained—some believing its affects to be due to general increased blood pressure; others to a specific action upon the secretory cells. Singularly, a repeated dose of pituitrin fails to affect blood pressure after it has once raised it and it has again returned to its normal state. While the various pituitary extracts act somewhat similarly, there appears to be some variation. Thus hypophysin has the essential physiologic properties of the extract of the macerated posterior lobe, especially exhibiting hypertensive and cardio-tonic effects. Pituitrin is less hypertensive but more strongly cardio-tonic. Hypophysin sulphate is said to combine all the good features of the ordinary extracts with few undesirable effects. The most toxic preparation is pituglandol, and the least poisonous, hypophysin. (See Harrower, *Practical Hormone Therapy*.)

Therapy.—Pituitrin, in the light of present knowledge, should be used only as an emergency remedy. Its most important field is in obstetrics to facilitate and accelerate labor, and after labor to control hemorrhage due to faulty contraction of the uterus. To a great degree it has supplanted ergot as an oxytocic. It is best adapted to, and is a safe agent in simple uterine inertia. It should only be employed, however, when the presentation and positions are normal, the tissues soft and dilatable, the cervix dilated at least to the size of a quarter of a dollar, the head actually engaged in the brim, and the pelvic diameters of such dimensions as to permit of normal delivery. Assured that these conditions are present and that uterine contractions lag, cease after having been active, or fail completely to come on; or there is danger of hemorrhage or exhaustion under the foregoing conditions, a single dose of fifteen minims (1 c.c.) of pituitrin may be administered hypodermatically. In from three to five minutes contractions will begin, and while increasingly powerful and persistent are said to more nearly resemble those of normal effort than are occasioned by ergot. Labor is rapidly terminated where pituitrin is given. Some obstetricians advise the drug also in breech presentations when the pelvic diameters are large, but good judgment would favor the forceps or other means lest asphyxiation of the child occurs. In no instance should it be used, as has been advised, in the first stage of labor to force dilatation. This is more safely accomplished by morphine, gelsemium or lobelia, which by quieting apprehension and excitement, as well as by relaxant effects favors a gradual or more nearly normal dilation than is possible through the powerfully contractive urge of pituitrin. Nor should the reprehensible practice be followed of using pituitrin to establish the diagnosis between false and true labor pain, thus needlessly increasing the discomfort and misery of the expectant mother. Some also advise it in face presentation when the pelvis is roomy and unobstructed. Chloroform and other general anæsthetics do not appear to retard the action of pituitrin. While non-poisonous and incapable of doing constitutional harm (except nephritis, with high blood pressure, be present), when wrongly used it may cause unnecessary pain and suffering, rupture the cervical and perineal tissues, and asphyxiate the child. In this respect the cautions applicable to ergot hold good. But when clearly indicated and there is a clear and unobstructed passage-way,

and parturient relaxation and adjustment are normal, pituitrin may convert a tedious labor of hours duration into a rapid delivery within an hour's time.

Pituitrin is advised in Cæsarean section as soon as the womb is completely emptied of fetus, placenta, and membranes; to favor involution after abortion and miscarriages, under similar conditions; in menorrhagia and metrorrhagia, not dependent upon inter- or intrauterine growths; and almost any form of uterine bleeding except when due to carcinomata, in the latter of which it does harm. It has also been advised in post-partum cases, as well as after gynecologic and other operations, to assist in the expulsion of urine in urinal retention due to atony of the bladder, and to release impaction of the bowels by its powerful stimulation of peristalsis. While it is effective in post-partum hemorrhage it is not better than good ergot preparations, but by sensitization of the uterus allows the latter to act more forcefully. A combination of ergot and pituitary extract are most effective (Watson).

Pituitrin may be used as a circulatory stimulant in collapse, and is probably the best vaso-motor stimulant in and to prevent surgical shock. It is valuable in intestinal torpor due to handling the bowels during abdominal operations, and to relieve the meteorism and "gas pains" due to lack of peristalsis under such circumstances. It has also been advised for the tympanites occurring in acute infectious diseases. Some advocate its use in that form of polyuria known under the old name of diabetes insipidus, a condition now believed to be due to disorders and disturbances of the hypophyseal gland. While it accelerates the production but probably does not increase the quantity of milk, its use as a galactagogue is not feasible because it cannot be given to effect by mouth, and it is not advisable to use it often subcutaneously. This also holds true of its use as a diuretic. Many physicians contend that the full dose of fifteen minims (1 c.c. or mil.) is too large and that they obtain far better results from seven and one-half minims (1/2 c.c. or mil.). The statements herein apply to the various preparations of the posterior lobe of the pituitary gland, as well as to pituitrin.

Contraindications to the use of pituitary extracts manifestly are: general hypertension, hyperpituitarism, and most cases of epilepsy. Whether or not they may induce arterial degeneration as has been asserted, or will damage the kidneys, causing hematuria and glomerulitis, as has also been charged, remains to be definitely proved.

PIX LIQUIDA.

Tar, Pine Tar.

A liquid obtained by the destructive distillation of the wood of *Pinus palustris*, Miller, and other species of Pinus (Nat. Ord. Pinaceæ).

Description.—A blackish-brown, viscid, semiliquid, amorphous substance, but gradually becoming granular and opaque; odor empyreumatic and terebinthinate, taste sharp and tarry. Slightly soluble in water, with a brownish color and acid reaction. Mixes with alcohol, ether, chloroform, and oils. Upon distillation it yields *oil of tar* and pyroligneous acid. *Dose*, 5 to 15 grains.

Principal Constituents.—Oil of turpentine, creosote, phenol, catechol, xylol, toluol, acetic acid, acetone, methyl alcohol, and at least ten resins.

Preparations.—1. *Oleum Picis Liquidæ Rectificatum*, Rectified Oil of Tar. *Dose*, 3 to 5 minims.

2. *Aqua Picis Liquidæ*, Tar Water. *Dose*, 1 to 3 fluidounces every four to six hours.

3. *Syrupus Picis Liquidæ*, Syrup of Tar. *Dose*, 1 to 2 fluidrachms.

Action.—Tar is irritant and antiseptic. Upon prolonged application tar acne may ensue, and in some instances it has produced poisoning similar to that of phenol. Internally it excites the circulation and the secretions, especially of the kidneys and lungs, and acts as an antiseptic to those tracts, thus proving diuretic, disinfectant and expectorant. Overdoses produce headache, indigestion, black vomit and stools, and blackish urine with blood and albumen and a decided tar-like odor.

Therapy.—*External.* Tar is chiefly used as an antipruritic and antiparasitic. It is of use in scaly skin diseases, and in various preparations it has been applied in psoriasis, chronic eczema, prurigo, porrigo, lichen, sycosis, lupus vulgaris and erythematosus, pemphigus, tinea capitis and other forms of ringworm, scabies, and boils. Some persons are very susceptible to tar, an erythema following the application of even dilute preparations of it.

Internal. Tar water, or syrup of tar, may be used in bronchial cough, and to prevent the recurrence of boils, in chronic urinary catarrhs, and in eczema and psoriasis (together with its external use). Tar should not be given to those having a disposition to hemorrhages. Syrup of wild cherry added to tar water or the syrup of tar makes a useful cough remedy for chronic bronchitis.

PLANTAGO.

The whole plant of *Plantago major*, Linné (Nat. Ord. Plantaginaceæ). A very common weed everywhere, especially in lawns and along roadsides, growing in rich soils.

Common Names: Plantain, Rib Grass, Ribwort.

Principal Constituents.—Resin, and citric and oxalic acids.

Preparation.—*Specific Medicine Plantago. Dose*, 1 to 60 drops.

Action and Therapy.—*External.* The crushed leaves very promptly relieve the distressing symptoms caused by punctures from the horny appendages of larvæ of lepidoptera and the irritation produced by certain caterpillars, as well as the stings of insects and bites of spiders. The promptness with which it relieves the burning pain of wounds caused by the first named and dissipates the rapidly spreading erythema, as we have personally experienced, leads us to believe it may be of value in erysipelas, and should be tried when that disease occurs in the summer season when the fresh plant can be obtained. The alcoholic preparations have been advised as topical applications in toothache, when due to a sensitive pulp, and in earache.

Internal. Plantago is reputed useful in bed wetting in children, due to relaxation of the vesical sphincter, with copious discharge of pale urine.

PLUMBI ACETAS.

Lead Acetate, Sugar of Lead (Formula: $Pb(C_2H_3O_2)_2+3H_2O$).

Description.—Transparent, colorless, shining crystals, or heavy, white, crystalline masses or granular crystals having a sweetish-astringent and subsequent metallic taste and a slight acetous odor. Easily soluble in hot and cold water, and less so in alcohol. *Dose*, 1 to 4 grains.

Preparations.—1. *Liquor Plumbi Subacetatis*, Solution of Lead Subacetate (Goulard's Extract). A sweet astringent, colorless fluid.

2. *Liquor Plumbi Subacetatis Dilutus*, Diluted Solution of Lead Subacetate (Lead Water). A 4 per cent solution of the preceding solution. Both are used topically only.

Action and Toxicology.—Outside of being sedative and astringent, this salt in a single medicinal dose seldom has any other marked action. A large dose occasions poisoning, as does its continuous use. (See below.)

Acute Lead Poisoning.—Lead is a poison, though not specially active, and when taken internally it is absorbed, and may be detected in the fluids and solids. The soluble lead salts are most apt to produce acute poisoning and the insoluble compounds chronic poisoning, and this sequence is scarcely ever reversed. The nitrate is the most poisonous salt, the acetate the least. In acute lead poisoning there is a burning, prickling sensation in the fauces, thirst, dryness of tissues, gastric uneasiness and vomiting of whitish, curdy or milky-looking material, and severe intermittent colic relieved by pressure. Obstinate constipation is the rule. The abdomen is tense, with the skin retracted and cold. The stools are dark or black, due to the formation of lead sulphide. If protracted, the nervous system is involved, giddiness, torpor, and coma sometimes being present, while numbness, cramps of calves of the leg and inner side of thighs, and paralysis may take place. A blue line may sometimes be observed upon the gums, but it is less likely to be found than in chronic poisoning. *Treatment.* For acute poisoning the soluble sulphates in large quantities are the antidotes. Epsom salt (magnesium sulphate) and Glauber's salt (soldium sulphate) are the best and most convenient. The emetic or stomach pump should be used, opiates given to relieve pain, and hot applications applied to the abdomen and feet.

Chronic Lead Poisoning or Plumbism.—When the system is impregnated with lead (chronic lead poisoning) it produces a leaden discoloration of the gums, teeth, and mucous membrane of the mouth (also found in bismuth absorption), a peculiar lead taste and odor, jaundice, emaciation, and a feeble, irregular state of the circulation, the pulse being often reduced to forty or forty-five beats per minute. The "blue line" on the gums when present is a most characteristic symptom of chronic lead poisoning. In large doses, or when continued for some time in small doses, lead gives rise to certain abdominal pains, termed *lead colic;* sharp pains in the limbs, unaccompanied by either redness or swelling, and which are increased by motion, and diminished by pressure, and are frequently accompanied by hardness, and cramps in the affected parts, and which condition is termed *lead arthralgia; lead paralysis*, which attacks the extremities, more commonly the upper, and which appears to affect the extensor muscles principally, the hands being bent or dropped (*wrist-drop*) and the arms dangling by the side. There may also be a paralysis of sensation. They brain may also become affected with what is termed *lead encephalopathy*, manifested by furious or tranquil delirium, more or less profound coma, or convulsions. Neuritis and multiple neuritis are not uncommon results. *Painters' colic* (*colica pictonum*) is a peculiar affection attacking painters and other workers in lead. Its most characteristic symptoms are severe colic with a sense of sinking about the region of the navel, and a peculiar form of paralysis allowing the hands to drop (*wrist-drop*). General paralysis may occur, the skin becomes yellow, and on the abdomen retracted, constipation is obstinate, emaciation marked, the blue line is pronounced, and if severe enough epileptoid convulsions ending in death may ensue. When coma

or convulsions occur death is very apt to follow. Painters and workers in lead are more commonly poisoned, but occasionally families are poisoned by drinking water from new lead pipes (allowing solutions of sulphuric acid or soluble sulphates to stand in the pipes will prevent this); typesetters are prone to lead-poisoning, and flour has been known to contain enough lead (from repairing holes in the mill stones with the metal) to act as a poison. Lead chromate used to color pastry has produced serious results.

Treatment. In cases of chronic poisoning by lead, the antidotal treatment is to place the patient in a bath made by dissolving in a wooden tub sulphide of potassium, four ounces in thirty gallons of warm water, which converts the lead on the surface to a black sulphide, which must be removed by means of soap and water and a good stiff brush. This should be repeated every few days until the skin no longer becomes discolored by the sulphuretted bath. Internally, water acidulated with sulphuric acid should be drunk; or solutions of the sulphates of sodium or magnesium (less effectual than in acute poisoning), or of alum. The latter, in two-grain doses, with full doses of morphine or opium are said to be specific for lead colic. In lead constipation, opium, by releasing muscular contraction of the intestines, is sometimes the only successful medicine. Iodide of potassium should be given to render the lead with which it comes in contact more soluble by forming double salts, so that it can be more readily passed from the system. The latter salt is by far the best and most common antidote now employed for *chronic* lead poisoning. From five to twenty grains, well diluted, should be given three times a day. The bowels must be kept regular by castor oil, to which croton oil may be added if necessary; opiates may be given to relieve pains and cramps, and overcome constipation; tonics to improve the strength when there is much debility; and nux vomica or strychnine, with electricity and friction, massage or shampooing, to overcome the paralysis.

Therapy.—*External.* Lead acetate is sedative, astringent and styptic. When applied locally it usually blanches the skin. Solutions of about one to six grains are popular as injections for the control and restraint of gonorrhœa. If unwisely used and there is ulceration of the urethral canal they may contribute to the formation of stricture. Used in the proportion of one-half grain to the ounce of alcohol, it is a very effectual remedy in simple dermatitis, and for dermatitis venenata or poisoning by ivy. As ordinarily used in solution in water it is less effectual in rhus poisoning; the alcohol contributes to the removal of the poisonous principle and aids in a more rapid cure. Sometimes hydro-alcoholic solutions may be employed. If much excoriation exists care should be had lest lead be absorbed with toxic effects. Lead solutions should not be used upon the eyes, as was formerly the custom, as corneal opacity has resulted when so used in corneal ulcer and abrasions.

Other lead solutions (subacetate, as Goulard's extract, and the diluted form, lead water) are sometimes employed upon painful hemorrhoids and inflammatory surfaces, in urticaria, and cutaneous hyperæsthesia. Lead water and opium has been largely employed upon painful sprains and similar injuries. These solutions are rarely used by Eclectic physicians.

Internal. Acetate of lead is an efficient astringent and sedative, but

in large doses is irritant. An overdose is generally followed by vomiting, thus usually preventing severe poisoning, and few deaths have ever occurred from it when administered therapeutically. Eclectic physicians, however, seldom employ lead salts internally. It has been advised for the control of serous diarrhœa (with camphor and opium) not yielding to simpler remedies, to control hemorrhage and pain in gastric ulcer, and in uncontrollable colliquative diarrhœas of tuberculosis. Obstipation may be produced by it when desirable, after surgical operations upon the ano-rectal segment of the bowels.

PODOPHYLLUM.

The dried rhizome and roots of *Podophyllum peltatum*, Linné (Nat. Ord. Berberidaceæ). Rich woods and thickets of North America. *Dose*, 5 to 30 grains.

Common Names: May Apple, Mandrake, Lemon Apple, Wild Lemon, Raccoon Berry.

Principal Constituents.—*Resin of podophyllum* (see below) and podophyllic acid, a coloring substance; *podophyllotoxin*, the purgative principle of the resin exists free in the rhizome.

Preparations.—1. *Specific Medicine Podophyllum. Dose*, 1/10 to 30 drops; fractional doses preferred.

2. *Elixir Podophylli*, Elixir of Podophyllum. *Dose*, fl℥ss to fl℥i.

Derivative.—*Resina Podophylli*, Resin of Podophyllum (Podophyllin). A light brown to greenish-yellow, amorphous powder turning darker when heated above 77° F, or when exposed to light. It has a faint peculiar odor and feebly bitter taste. It is very irritating to the conjunctivæ and to other mucous membranes. Soluble in alcohol, chloroform and ether. It consists chiefly of the purgative principle *podophyllotoxin* mixed with *podophyllic acid* (80 per cent), other minor resins, and a yellow, coloring body, *podophylloquercitin*. Resin of podophyllum was first isolated and used by Dr. John King. *Dose*, 1/30 to 1/2 grain.

Preparation.—*Trituratio Podophylli*, Trituration of Podopohyllin (1 to 100). *Dose*, 5 to 10 grains.

Specific Indications.—*I. Podophyllum.* Podophyllum is specifically indicated by *fullness* of tissues, and particularly by fullness of superficial veins; oppressed full pulse; dirty yellowish coating of tongue and dizziness. It is contraindicated by pinched features and tissues, contracted skin and tongue.

II. Resin of Podophyllum (Podophyllin). Podophyllin is specifically indicated by fullness of tissues, fullness of veins, sodden, expressionless countenance, dizziness, tongue coated dirty yellowish-white, heavy headaches, indisposition to bodily exertion, intestinal atony, with sense of weight and fullness, full open pulse; "pain deep in ischiatic notches;" and as an ideal cholagogue; clay-colored stools, floating upon water; stools, hard, dry, and accompanied by distended abdomen and colicky pain. It is contraindicated by pinched features, and small, wiry pulse, or when the pulse has a sharp stroke.

Action and Toxicology.—Applied continuously podophyllum and its resin cause irritation and suppuration of the skin and subcutaneous tissues; inhaled they provoke sneezing and violent coryza, and drug workers handling either are sometimes affected with conjunctival inflammation. The green rhizome or large doses of the dried drug (30 to 60 grains), or its resin, produces violent emeto-catharsis and gastro-enteritis. Smaller doses are cathartic; and doses short of catharsis induce ptyalism. Hence the names once applied—"vegetable mercury" and "vegetable calomel". Both undoubtedly increase the secretion of bile, notwithstanding the many state-

ments to the contrary. This is most apt to occur from the small dose which stimulates, and less likely from a drastic dose which hurries the drug through the intestinal canal. Even the latter is said to cause a flow of biliary secretion, probably by emptying the duodenum and producing a derivative effect. All the intestinal glands are stimulated by podophyllum; and the catharsis, like that from jalap, is slow, sometimes from ten to twelve hours (podophyllin, four to ten), and even a day elapsing before purgation takes place. Then it is likely to persist several days and if the dose be large to occasion debilitating hydro-catharsis. Very little tormina is caused by them compared with the thoroughness of their action. This may be prevented, in a measure, by administration with leptandra, hyoscyamus or belladonna and aromatic carminatives, such as ginger, cloves, etc. When the resin is precipitated by alum in its preparation, it is more apt to gripe; common salt intensifies its action and cream of tartar increases the hydragogue effect; alkalies favorably modify or check its activity. Podophyllin (resin of podophyllum) is correspondingly more energetic than the parent drug. The evacuations of podophyllum purgation are copious, prolonged, and dark or bile-stained in color.

Overdoses of podophyllum, or its resin, produce hyper-emesis, drastic hyper-catharsis, with griping and tormina, and large doses have caused death by gastro-enteritis. Even moderate doses, when contraindicated, occasion painful and griping irritation and inflammation.

Therapy.—*I. Podophyllum.* Podophyllum is a certain but slow cathartic; it is also alterative. Unlike most strong cathartics the effects are quite permanent and the tone of the intestines improved. It may be used in nearly all cases in which podophyllin is useful, though there are some conditions where the former gives better results than the latter. (Compare *Resina Podophylli* on page 557). These conditions we will briefly notice. It is conceded that as an alterative it is infinitely more decided in its action than the resin. It exerts a strong influence upon the glandular system. Associated with proper hygienic measures and the indicated tonics and other alterative drugs, it will give good results as an aid to elimination of broken-down products in the secondary phase of syphilis, in so-called chronic rheumatism and in scrofula. The dose should be small, not sufficient to produce any marked intestinal activity. In stomach troubles, podophyllum is often superior to podophyllin. It acts as a gentle stimulant tonic, improves the appetite, and is particularly valuable in atonic dyspepsia, gastric and intestinal catarrh, and atonic forms of indigestion, when the patient complains of dizziness, loss of appetite, and heavy headache. There is indisposition to exertion, the movements being heavy and sluggish, the tongue is dirty and flabby, and the superficial veins, abdomen, and tissues in general are characterized by *fullness*. Its action on the liver renders it particularly serviceable where gastric disturbances are due to hepatic torpor. In stomach disorders, hydrastis, nux vomica and other tonics and peptics may also be indicated and associated with this drug. Podophyllum, iris, chionanthus and chelidonium are excellent agents for that rarely occurring affection, chronic hepatitis. By its slow and thorough action, yet permanent in its effects in restoring and maintaining the normal hepatic and intestinal secretions, podophyllum is one of the very best agents to

overcome habitual constipation, and more especially if it be due to portal engorgement. The small dose should be given and continued until the evacuations become regular and normal. Formerly this drug was much employed in bilious, remittent and intermittent fevers. Cathartic and sometimes emeto-cathartic doses were employed with the result of producing so profound an impression on the hepatic function and on the portal circle and general glandular system that, it is asserted, the disease was often aborted, or at least rendered milder and of short duration. It is never so employed at the present day. When at the inception of fevers a cathartic is needed, which, however, is not often, specific medicine podophyllum may be combined with compound syrup of rhubarb and potassa (neutralizing cordial), or to render it milder, lobelia, ipecac, leptandra, hyoscyamus or belladonna may be administered with it. Though rarely now used as a cathartic in dropsy, if selected at all, it should be given with cream of tartar. Further uses of this drug are identical with those of podophyllin, some preferring to employ interchangeably one for the other for the purposes named here and under Podophyllin. The usual medicinal dose of specific medicine podophyllum ranges from one to ten drops. Dose of the powdered root (almost never used), as a cathartic, from ten to thirty grains; of the tincture, from ten to sixty drops; as a sialagogue and alterative, from one to five grains of the powder, or from one to ten drops of the tincture.

II. Resin of Podophyllum (Podophyllin). Podophyllin possesses the cathartic properties of the crude drug in an exalted degree. While it is slow in action, it is certain in its results. Some persons are so susceptible to the action of the drug, that a dose of one-half grain will actively purge them. The ordinary cathartic dose of this resin generally requires from four to ten hours to act, but this action is quite persistent, often producing copious alvine discharges for one to two days, and when over leaves the intestines in a normal condition, seldom being followed by the after-constipation so common from the use of ordinary purgatives. As with the crude drug the cathartic action of podophyllin is increased by common salt. From four to eight grains operate as an active emeto-cathartic, with griping, nausea, prostration, and watery stools; from two to four grains, as a drastic cathartic, with nausea and griping; from one-half to two grains generally operate as an active cathartic, leaving the bowels in a soluble condition; in very small doses, it is gently aperient and alterative. In doses of one-half or one grain, it is one of our most valuable cholagogue cathartics, operating mildly, yet effectually and very persistently arousing the biliary and digestive apparatus to a normal action. It also exerts a favorable influence on the cutaneous functions, producing and maintaining a constant moisture on the skin. In doses of from one-eighth to one-half grain, or rather in doses insufficient to purge, it is strongly but quietly alterative, and will induce ptyalism in some persons. This drug should not be given in bulk, but should be combined with ginger, hyoscyamus, leptandra, or some form of alkali, which renders it less liable to nauseate or gripe. Should catharsis be too severe, an alkaline solution, with aromatics, by mouth, will check it. A popular and good method of preparation is that of triturating it with milk sugar (lactin). This not only obviates, to a certain extent,

its irritant action, but singularly increases its purgative qualities. During its administration, all articles of food difficult of digestion should be avoided. According to Locke podophyllin prepared by alum water is apt to gripe. Eclectics long made use of this resin in cases where mercurials were used by other practitioners, and found the result vastly in favor of resin of podophyllum. It appeared to fulfill all the purgative indications, at least, for which mercurials were recommended and used.

It is not, however, for its cathartic use that podophyllin is most valued by the Eclectic profession, but rather for its specific effect when given in small doses. Properly administered it is a stimulant to the sympathetic nervous system, acting principally upon the parts supplied by the solar plexus. It improves digestion and blood-making and stimulates normal excretion. For its action upon the liver, repeated small doses of the trituration (1 to 100), or a daily pill of podophyllin (1/20 grain) and hydrastin (1/4 grain) is much to be preferred to its cathartic dose. It should be given in the same manner when its action on the pancreas and spleen is desired.

The value of podophyllin in small doses, in gastric and intestinal disorders, has not been as well appreciated as it deserves to be. It has a specific action on forms of stomach and bowel trouble with atony, characterized by full and relaxed tissues, with mucous discharge. The case is never one of loss of function from irritability, but from atony. In the summer disorders of children, especially cholera infantum, it often will be indicated, and is quick to restore normal action when the bowels are loose, with passages of mucoid, slimy material. The movements of the child are sluggish, the tongue is coated a dirty yellowish-white, the superficial veins are full, and the countenance is dull and expressionless. In chronic types of disease, associated with feeble digestive power, which is but little improved by the ordinary stomach tonic, this drug renders excellent service. The trouble is usually atony of the upper part of the small intestines, and the stimulant dose of triturated podophyllin corrects the difficulty. Podophyllin is a favorite anti-constipation remedy. It is equally valuable in costiveness of the young child and in the aged. In very young babies this trouble will yield to: ℞ Podophyllin (2 x trit.), gr. xxx; Brown Sugar, ℥ii; Water, fl℥iv. Mix. Sig.: Teaspoonful four times a day. For adults the daily use of from one to two of the podophyllin and hydrastin pills (1/20 and 1/4 grain) will generally be sufficient to gradually overcome the trouble. The cathartic dose should never be employed for the relief of constipation, or when a cholagogue action is required. When the stools are hard and grayish-white or clay-colored, and float upon water, the remedy is especially effective, as it is also in dry stools, with tympanitic abdomen and wandering, colicky pains. Flatulent colic of children, when associated with constipation, will readily yield to small doses of this drug, while as a remedy for dysentery and both acute and chronic diarrhœa, all of the recurring type and accompanied by portal sluggishness and hepatic torpor, few remedies will excel it. Dyspepsia, with atony and thickened mucous membranes secreting abundantly, calls for stimulant doses of podophyllin. The head feels full, the tissues and veins appear full and doughy, the skin is sodden, and a dirty coating covers the tongue from tip to base. ℞ Pod-

ophyllin, 1/20 grain, three times a day. Cardialgia, accompanied by constipation, sometimes yields to the trituration (1 to 100).

This drug has been justly valued in hepatic disorders. In that state ordinarily known as "biliousness," this drug or specific medicine iris can usually be depended upon. Indeed, they act well in combination. There is dizziness, a bitter taste, the stools show an absence of bile, and greenish, bitter material is vomited. Podophyllin is often indicated in both acute and chronic hepatitis, though usually contraindicated in inflammations of the gastro-intestinal tract. Fullness in the region of the liver, with aching under the scapulæ and in the back of the neck, with dizziness, usually calls for this drug. In catarrhal jaundice with clay-colored stools it may be alternated with chionanthus. In the unpleasantness attendant upon the retention or passage of biliary calculi, and in mild forms of cholecystitis a purge of podophyllin may assist in relieving distressing symptoms or in aiding the passage of the concretions. It is not, however, a drug to be relied upon unaided, either for a cure or to remove the calculi, but rather to improve the secretion and elimination of bile. When indicated there is great pain in the region of the gall bladder coursing to the left and downward. Sometimes there is constipation, as often diarrhœa. There is a bad taste, and the patient is jaundiced. ℞ Podophyllin, gr. ij, at night, followed in the morning with a large quantity of olive oil. In hemorrhoids, dependent on biliary insufficiency with portal inactivity, it may be given in alternation with sulphur, the podophyllin being particularly desired when there is constipation with tenesmus. The small dose alone is required, from 1/20 to 1/10 grain, three or four times a day.

Podophyllin may give good service in cough accompanied by bronchorrhœa, especially if it be associated with gastric catarrh. Here minute doses of sulphur are also valuable. In heart disease, when aggravated by hepatic inactivity and portal torpor, the cardiac remedy may be rendered more efficient if associated with minute doses of this drug. It has long been recognized as serviceable in the rheumatic diathesis, when the patient is sallow and inactive, presents fullness of tissue, and complains of dull pain and heaviness in the right hypochondrium. In renal disorders, when the general specific indications for its use are present, it will usually restore the secretory power of the kidneys.

Podophyllin has long enjoyed the reputation of exerting a powerful action upon the lymphatic glandular system. It acts quietly but effectively as an alterative, one of the best in the whole domain of medicine, at the same time aiding and improving the digestive process. It was formerly, and is still with many, a favorite remedy in secondary and tertiary syphilis as an eliminant of broken-down material. Ellingwood declares it a good remedy for persistent pustular conditions, eczema, and cracked or fissured skin.

Podophyllin is a remedy for pain, according to Scudder—deep-seated pain in the ischiatic notches. It has served a good purpose in inflammations (when not of the digestive tract), accompanied by great constipation. Here the cathartic action is required, as it is also in the forming stage of febrile diseases, with the exception of typhoid fever, in which it is not to be commended, notwithstanding it was a prominent medicine in the so-called Woodbridge and other supposed abortive forms of treatment for enteric

fever. In malarial cachexia, small doses of podophyllin may be alternated, or given with cinchona or quinine. For all of the preceding uses specific medicine podophyllum may also be used, but the dose must be correspondingly larger. For the gastric disorders many prefer it to the resin. Younkin advises cathartic doses (1/6 grain, every two hours, with ten grains of potassium bitartrate) for the relief of gonorrhœal epididymitis. The dose of podophyllin, as a cathartic, is from 1/2 to 2 grains; as an alterative and stimulant, 1/100 to 1/10 grain; as a cholagogue, 1/20 to 1/10 grain. A good form in most disorders requiring the small dose, is the following: ℞ Podophyllin Trituration (1 to 100), gr. v to xxx; Water, fℨiv. *Dose*, one teaspoonful every one to three hours.

POLYMNIA.

The root of *Polymnia Uvedalia*, Linné (Nat. Ord. Compositæ). Central United States to Florida. *Dose*, 5 to 30 grains.

Common Names: Uvedalia, Bear's Foot, Leaf Cup.

Principal Constituents.—A dark-brown, acrid resin and a straw-colored, balsam-like resin.

Preparations.—1. *Specific Medicine Polymnia. Dose*, 1 to 30 drops.
2. *Unguentum Polymniæ*, Ointment of Polymnia (Uvedalia Ointment). Fresh Polymnia, 8; Lard or mutton tallow, 16. Light green in color.

Specific Indications.—Full, sodden, inelastic, flabby tissues; splenic and hepatic enlargement, with fullness, weight and burning in the hypochondriac and epigastric regions; congestion and impairment of the functions of the organs supplied by the cœliac axis; impaired blood-making with tumid abdomen; low, inflammatory deposits.

Action and Therapy.—*External.* Uvedalia stimulates the growth of hair. Scudder advised the following hair tonic: ℞ Specific Medicine Polymnia, fℨij; Bay Rum, fℨvj. Mix. Sig.: Rub thoroughly into the scalp once or twice a day. Howe added to this lotion Tincture of Cantharis, fℨij, and Fowler's Solution of Arsenic, fℨij. Uvedalia ointment may be used, rubbed warm and well into the abdomen, for the reduction of engorged spleen (ague cake); the specific medicine must be administered internally at the same time. Its discutient powers have been taken advantage of in other painful swellings due to low inflammatory deposits and in mammitis particularly, scrofulous enlargement of the lymphatic glands, and spinal irritation.

Internal. Polymnia is one of the best of the spleen remedies reducing engorgement of that organ best when due to malarial cachexia. To a lesser degree it has a similar effect upon the liver. Its special field of activity is upon the parts supplied with blood by the cœliac distribution. It is thought to favor a better splenic participation in blood-making; and may well be further studied for its influence upon all the ductless glands. In atonic dyspepsia and chronic gastritis depending upon a general cachexia, most often malarial, with a sluggish gastric and hepatic circulation, and attended by full, heavy, burning sensation it is often of signal benefit. It is still undetermined whether it exerts a specific influence upon leucocythemia; but it is certain that the correction of splenic and hepatic wrongs by this drug cannot but exert a beneficial effect. To be of any service in affections of the ductless glands it should be administered for a prolonged period.

Scudder valued it for uterine subinvolution and hypertrophy of the cervix, when indicated by the sodden inelastic condition, pallid tissues and impaired circulation above referred to. Large doses of polymnia are said to produce painful emeto-catharsis, gastro-intestinal inflammation, convulsions and death.

POPULUS.

The bark of the *Populus tremuloides*, Michaux (Nat. Ord. Salicaceæ). Lower Canada and northern and middle United States. *Dose*, 1 to 30 grains.

Common Names: American Poplar, American Aspen, Quaking Aspen.

Principal Constituents.—*Populin* and *salicin* (which see).

Preparation.—*Tinctura Populi*, Tincture of Populus (saturated). *Dose*, 1 to 30 drops.

Specific Indications.—Marked debility with digestive impairment; tenesmic action *after* urination.

Action and Therapy.—A neglected remedy of considerable value in debility of the urinary tract and of the digestive organs. It acts best in small or fractional doses. When so given it is of value in tenesmic action of the bladder immediately following urination. Owing to the salicin and populin present it has had a considerable reputation in malarial fevers and should be more generally employed as a post-febrile tonic.

POTASSA SULPHURATA.

Sulphurated Potassa, Liver of Sulphur, Hepar Sulphuris.
A mixture of polysulphides and thiosulphate of potassium.

Description.—Irregular liver-brown pieces when fresh, becoming successively greenish-yellow and gray through absorption of moisture, oxygen and carbon dioxide. It has a bitter, acrid and alkaline taste, and the disagreeable odor of sulphuretted hydrogen. Very soluble in water and only partially (sulphides) in alcohol. *Dose*, 1 to 10 grains.

Action and Therapy.—*External.* In the form of a wash or the ointment, sulphurated potassa is useful in skin diseases of a parasitic character, especially scabies. It is also occasionally used in chronic forms of eczema, and in psoriasis. It is seldom used internally.

POTASSII ACETAS.

Potassium Acetate, Acetate of Potash. (Formula: $KC_2H_3O_2$.)

Description.—A hygroscopic, white powder or crystalline masses of a satiny luster, without odor or having but a faint acetous odor and possessing a warming saline taste. Very deliquescent on exposure to the air, and very soluble in both water and alcohol. *Dose*, 10 to 60 grains.

Specific Indications.—Retention of worn-out material in the body; imperfect renal elimination of broken-down solids; deposits of cacoplastic material, giving rise to inflammations and fever; tongue pallid, with light, pasty fur; scanty urine, with dull headache; sluggish lymphatic elimination; hepatic torpor; rheumatism with swollen joints, dirty tongue, and elevated temperature.

Action.—Potassium acetate is one of the mildest of the potassium salts, scarcely producing any irritation of the stomach, and only in large doses may it prove laxative. It does not neutralize the gastric juice. When in the body it becomes decomposed and enters the blood stream as a carbonate. In this manner it increases the alkalinity of the blood and the urine, and proves decidedly diuretic. This quality was recognized long before its

chemical change was understood, and from this circumstance it was once popular under the name *sal diureticus*.

While potassium acetate is a typical diuretic, it is not of great value when dropsy is a symptom except, perhaps, in that temporary form following scarlatina and other acute infectious diseases; or following obstructive hepatic disorders of non-malignant type. It is also advised in general dropsy due to faulty heart action. Only when the kidneys are intact should it under any conditions be expected to favor improvement. An occasional dose is useful to cleanse the renal tract in syphilis and gonorrhœa, and it aids materially in the removal of effete matter which is causing, prolonging or aggravating many of the skin eruptions, especially acne, boils, and carbuncle. Potassium acetate has been used with more or less success in the uric acid diathesis and for urinary calculi. Probably the only form of the latter in which it succeeds is that in which there are multiple particles agglutinated by mucus. By removing the latter disintegration is accomplished. It is by no means likely that it has any solvent action upon the calculi alone.

Years ago much was heard about the renal depurant. The importance of such an agent was strongly impressed upon us, and we do not think the matter was overrated. We are sure that we have since greatly profited by the lessons then enforced. It was in the days when the phrase "to increase retrograde metamorphosis" was popular among physicians, a process that stood in some, but only partial, relation to what we now speak of as correcting the "errors of metabolism". Elimination of effete and deleterious matter was the object—as justifiable now as then. One of the ways in which the elimination of the broken-down products of life can be encouraged is through the renal function. Formerly, we believe, more care was taken in producing kidney elimination, when simple and kindly remedies were used, in contrast with some of the stronger antiseptic eliminants, like urotropin, etc., of present-day renal therapy. The eliminant employed was called by the Eclectic the renal depurant. It was a good name and it was good medication. Seemingly, however, the remedies and the procedure have been much neglected by present-day physicians.

In treatment by means of the renal depurant it was argued that it was impossible to make good blood when there was in it old and effete material, and it was impossible to improve the nutrition of an organ until the old and broken-down tissues could be gotten rid of. There is truth in these premises; truth largely proved by the good results obtained by using safe and gentle medicines, in carefully gauged doses, for accomplishing the purification.

The typical renal depurant was, and is, potassium acetate. Sodium acetate is a close second, but has never become very popular in America. When the body is loaded with unhealthy material, giving rise to fullness of tissues, vertigo, pain, or to unhealthy deposits, or to the favoring of the deposition of tubercle, or to the manifestations of that near relative of tuberculosis—scrofula—if, indeed, that be not tuberculosis of the lymphatics; and when desirable to eliminate the detritus accompanying or following chronic malarial impression, fevers, and particularly rheumatism, rheumatoid gout and neuritis, potassium acetate should by no means be

overlooked in the selection of remedies for eliminative and corrective effects. Its value in many conditions of recurring pain, so often attributed, without good reason, to rheumatism, and even in true rheumatic arthritis, we believe it a most helpful agent and one that should enter into treatment as an adjunct at least. The observing patient, who is taking potassium acetate, will tell you that when the urine passes it seems to be thick and smooth and flows easily as if it were removing some soft mucus-laden material. Certain it is that it increases the output of solids. Therefore, its occasional use should be of great advantage in keeping the body clear of such detritus as can be safely removed by renal action—material that paves the way for chronic nephritis and arteriosclerosis. Patients of middle age should have an occasional dose of the salt when the urinary product is scant and high-colored.

In uric acid gravel it is believed to prevent the formation of crystals by rendering the urine alkaline—a condition in which it is not possible for the concretions to form. Locke was partial to a combination of this salt with salicylic acid for acute articular rheumatism, when the tongue is dirty, the joints greatly swollen, and the temperature elevated. ℞ Potassium Acetate, ʒvi; Salicylic Acid, ʒij; Water, fl ʒiv. Mix. Sig.: One teaspoonful in a wineglass of water every three or four hours. Others have found it, given alone well diluted, of value in so-called chronic rheumatism.

The unpleasant taste of the acetate has been the greatest drawback to its use. When given in water alone it is very unpleasant. It may be given in simple elixir, but one should avoid, as far as possible, too much alcohol in the cases needing renal depurants, and some object to the sugar. In the standard elixirs, containing buchu, corn silk and oil of sandal wood, with the potassium acetate, one is compelled to give a number of medicines not desired, and perhaps contraindicated. Where both are indicated, and they usually are, the following is a good form of administration: ℞ Potassium Acetate, ʒi; Essence of Mentha Viridis, fl ʒi; Simple Elixir, fl ʒij; Water, q. s., fl ʒiv. Mix. Sig.: Take at one dose. Plenty of water always should be given with potassium acetate. When dispensing it in solution (if to be taken within a few days, for it changes upon being kept long) we frequently add the essence of spearmint, both for its preservative effect and to increase the watery element in elimination. Potassium acetate increases the output of solids; spearmint the output of water. If the patient cannot renew his prescription frequently, the salt, which is deliquescent, should be given him in bulk, in a closely-stoppered bottle, with directions to dissolve a given quantity in a large quantity of water. From thirty (30) grains to four (4) drachms may be given in twenty-four hours, if need be, but we prefer about one drachm a day for several days, with a rest of a few days, resuming the medicine as needed.

POTASSII BICARBONAS.

Potassium Bicarbonate, Bicarbonate of Potash. (Formula: $KHCO_3$.)

Description.—Permanent, transparent, colorless crystals, or a granular white powder, without odor but having a saline and feebly alkaline taste; freely soluble in water, but almost insoluble in alcohol. *Dose*, 5 to 30 grains.

Specific Indications.—Leaden pallor of tongue and mucosa, and tremulous action of voluntary muscles; debility out of proportion to diseased conditions.

Action and Therapy.—*External.* Potassium bicarbonate, well diluted, is an excellent and unirritating material for softening and removing scales upon the palpebral margins in ciliary blepharitis, and for cleansing the aural canal of scaly deposits. It may also be used upon the skin to allay irritation and itching in dermatitis, especially that caused by Rhus Toxicodendron and by sunburn.

Internal. This salt is antacid and diuretic. It is less irritating and pleasanter in action than the carbonate and the liquor potassæ. While it is usually less effective where a strong antacid is required than the corresponding sodium salt, it is preferable for little children when given in small doses and well-diluted. When there is a tendency to the formation of uric acid it may be used with good effect, and in those types of rheumatism, arthritis and gout, with which uric may also be associated. In atonic dyspepsia, with mild hyperacidity, and the disposition to butyric fermentation, potassium bicarbonate is an agent of value, as it is also in biliary disorders aggravated by imperfect emulsification of fats and obstruction to the free flow of bile into the duodenum. Under such conditions it acts favorably in duodenal catarrh, catarrhal jaundice, and as an aid in preventing the formation of hepatic calculi. Its chief use in biliary disorders is to attenuate the bile and cleanse the mucosa, the same attenuating action being observed in its effects in chronic bronchitis, especially in the aged, in which it liquefies the sputum and renders it less tenacious. We have found the bicarbonate one of the most effective agents in malnutrition and marasmus of infants. We give it in minute doses usually in solution with a very small proportion of citric acid. This, of course, converts it into a slightly carbonated solution of potassium citrate. Potassium bicarbonate should preferably be given in the smaller doses well diluted. It is the alkaline ingredient of compound syrup of rhubarb and potassa (Locke's formula) or neutralizing cordial.

POTASSII BICHROMAS.

Potassium Bichromate. (Formula: $K_2Cr_2O_7$.)

Description.—Large, orange-red crystals, permanent and odorless, and having a bitter, metallic taste; freely soluble in water, more readily in boiling water; insoluble in alcohol. *Dose*, 1/30 to 1/3 grain. Usually the 3x trituration is employed in doses of 2 or 3 grains every 2 to 4 hours.

Specific Indications.—Irritation of respiratory organs, with hoarseness or aphonia; harsh, croupal cough, with scanty expectoration, or thick tenacious sputum, dyspnœa, and subacute inflammation; hoarseness and aphonia from enforced or prolonged use of the voice; dyspepsia with gastric catarrh and yellow-coated tongue; tendency to ulceration with sticky or stringy discharge.

Action and Toxicology.—In excessive doses this salt is a violent irritant and corrosive poison, and may quickly produce death. An ounce is said to have killed in a half hour, insensibility quickly following its ingestion; and two drachms of the salt have proved fatal. Habitually applied to the skin, in solution, it causes papules followed by pustules, finally terminating in deeply penetrating sloughs. Calico printers, who use this material, suffer from ulcers upon the hands and destruction of the nasal membranes and septum from inhaling its dust. The chief symptoms of poisoning by

potassium bichromate are: vomiting of dark hemorrhagic mucus, violent pain in the belly, purging, excessive thirst, cold skin, feeble speech, with rapid feeble pulse, hurried breathing, coma, heart failure, collapse, and death. If death does not take place there may be suppression of the urine for several days. The treatment is that for irritant corrosive chemicals in general. (Compare *Chromium Trioxide.*)

Therapy.—*External.* Like chromic acid this salt is cauterant and antiseptic, and though milder may be used for many of the topical purposes for which the acid is employed. Warts and excrescences may be painlessly removed, chiefly by absorption, by a concentrated solution of it (30 to 60 grains to water, ℥j), with but little or no sloughing or unmanageable ulcerations. It has also been used in dry gangrene. A strong solution is an effectual application in acute trachoma with large granulations.

Internal. This remedy has come into Eclectic therapy through those who have studied Homœopathic materia medica and therapeutics, and have made a rational selection from that source. In the early part of the century now passed it was advocated by many as an efficient agent in diphtheria, but a sufficient differentiation of the varieties of sore throat and the indications for the drug were not fully recognized. Membranous croup was not then so universally accepted as a form of diphtheria (laryngeal) as now, and while the agent is a good medicine for ordinary croup with tenacious secretion and for ulcerated forms of sore throat with sticky or stringy exudates, it does not in the least fulfill the requirements in genuine diphtheria. In the attenuations up to the 3x trituration, or the decimal solution, it is a useful agent in broncho-pulmonic troubles with sticky, tenacious mucus difficult to raise, and in ulcerated conditions of the throat and nose of a sluggish character and like secretions. A post-pharyngeal ulceration, with sticky, blackish crusts, occurring during a case of typhoid fever, was quickly removed by potassium bichromate 2x internally, and a spray of a 2 per cent solution of the crude salt. The most satisfactory results we have ever obtained in the treatment of acute coryza with profuse lachrimation and bland nasal discharges, was obtained from adding one drachm of a 2 per cent solution to four ounces of water, the dose being a teaspoonful every two hours.

This salt frequently relieves hoarseness and aphonia, with exudation and cough, laryngeal irritation with hoarseness and dryness of tissues, and the hoarseness resulting from cold, singing, or speaking. Hard, dry, rasping, bronchial cough is another indication for it. Webster asserts its value to relieve the cramping rheumatoid pains attending muco-enteritis and acute diarrhœa occurring in cold weather; while others value it for its recuperative power in bowel and stomach disorders tending to ulceration—especially that resulting from chronic diarrhœa and dysentery, when the colon becomes the seat of destruction. Again it has been recommended for gastric catarrh when the tongue is coated yellow. As an alterative Foltz believed it useful in croupous conjunctivitis and indolent corneal ulcer, with stringy secretions, and in granulated lids with tenacious discharges.

In disorders of the respiratory tract we have administered this salt in syrup, as follows: ℞ Potassium Bichromate gr. ij. Syrup fl℥iv. · Mix. Sig.: One teaspoonful every one to three hours, as needed.

POTASSII BITARTRAS.

Potassium Bitartrate, Cream of Tartar. (Formula: $KHC_4H_4O_6$.)

Description.—Permanent colorless or slightly opaque crystals, or a gritty, white, odorless powder, with a pleasant acidulous taste. Soluble in boiling water, and much less so in cold water; almost insoluble in alcohol. *Dose*, 5 to 60 grains.

Action and Therapy.—Potassium bitartrate is a hydragogue saline cathartic and diuretic, rendering the blood thicker by the abstraction of serum and causing some thirst. It is largely excreted by the bowels and kidneys, but a portion of it is converted into carbonate, thus rendering the urine alkaline. Inasmuch as it does not gripe when given in moderate doses, it has long been valued in various forms of dropsy to remove the watery accumulations. In full doses it usually produces rather prolonged watery purgation, and only when excessive amounts are given does it cause any distress. For post-scarlatinal dropsy Locke advised: ℞ Potassium Bitartrate, ℥ss; Juniper, ℥ss; Boiling Water, Oj. Infuse. Filter after allowing to stand for two hours and give a wineglassful three or four times a day.

Cream of tartar and sulphur form one of the popular laxatives for hemorrhoids, prolapsus ani, and as a "spring medicine to thin the blood". As a matter of fact it tends to concentration rather than an attenuation of that fluid. In this manner it is valued when one is subject to boils, pimples, and constipation, especially if plethoric.

Cream of tartar, in solution, sweetened and flavored with lemon, forms an agreeable, acidulous fever beverage. It may also be added to ordinary lemonade for the same purpose.

POTASSII BROMIDUM.

Potassium Bromide, Bromide of Potash. (Formula: K Br.).

Description.—Permanent, colorless or white, cubical crystals, or a granular, white powder, without odor, and having a sharp salty taste; very soluble in water, soluble in glycerin, and sparingly in alcohol. *Dose*, 1 to 60 grains.

Specific Indications.—Plethora, with vascular and nervous excitation; headache, or insomnia, with throbbing pain and fullness of the cerebral vessels, and great mental excitation; restlessness and nervousness in sthenic conditions; disorders associated with a vigorous circulation, without fever; extreme susceptibility to external impressions; spasmodic contraction of the muscles; epileptic seizures from sexual irritation or from irritation of the cerebral cortex; strong sexual excitement; spermatorrhœa of the plethoric; satyriasis; nymphomania; violent mania; purely reflex nervous vomiting; sea-sickness.

Action.—Locally, when applied in concentrated form, bromide of potassium is decidedly irritant to the mucous tissues. In ordinary amounts it will obtund the faucial tissues so that contact will not cause nausea or vomiting.

Bromides are rapidly absorbed when given internally; and very slowly eliminated. A single dose of one-half drachm has been asserted to have been detected in the urine after sixty days. Hence they may be regarded as possible cumulative salts when too vigorouly administered. When the kidneys are inactive they are more pronounced in their effects. In the case of the potassium salt, on account of its potassium base, damage is likely to occur

from its use when nephritis is present. If the alimentary canal is in an irritable condition bromides are apt to induce diarrhœa.

The bromides all resemble each other in action, except as slightly modified by their base. While most of them are sedative, slight stimulation is accredited by some to the ammonium salt. Taken as a whole the group, in full doses, produces drowsiness, sleep and a marked repression of all the nervous reflexes. These salts distinctly depress the motor and intellectual areas of the cerebral cortex; and while probably having but little effect upon the medulla, they have a marked depressive or sedative action upon the sensory pathways of the spinal cord, and to a lesser extent upon the motor neurons. The result is a decided lessening of reflex action, and, as Hare states, "a decrease in the ability to recognize pain". The action of the bromides is not one of abolition of function, but rather one of depression. Upon the nervous system the effects are observed in inverse order to the natural development of function; i. e., depression is manifested in a descending type from the higher brain downward along the cord.

The effects of the bromides upon the brain are noteworthy, diminishing mental activity and blunting the interpretation of the senses. While perception is not interfered with and impulses probably reach the brain in the usual way, they are not valued proportionately. The individual has little interest in what the brain perceives, and the tendency is an apathetic approach to drowsiness and sleep. The latter, attained, is not refreshing, and never profound, and the victim awakens with a more or less confused mind, a state which may persist for hours. Dullness, sometimes headache, slowness of thought and speech, a lapsing memory, and disposition to confuse sentences or to omit words are not uncommon effects of bromides before or after inducing sleep. The bromides render the mucous tracts of the throat and the genital organs somewhat insensitive, and the anaphrodisiac effect is pronounced. Unless the dose be very large or oft repeated little effect is observed upon the heart and circulation, nor is breathing much affected except by excessive doses. Toxic doses, however, strongly depress the respiratory center in the medulla. Bromides may irritate the stomach, particularly if already irritable, and either by this effect or through depressing reflex action may retard digestion by causing a slower secretion of gastric juice. Only enormous amounts affect the body temperature. Bromides are taken up freely by the plasma of the blood, like the chlorides, whose action they resemble in many ways, and are found in and eliminated in all the fluids of the body—the tears, sweat, urine, semen, bronchial mucus, milk, and feces —being mostly discharged very slowly and unchanged by the kidneys. Tissue waste is retarded by the bromides, though the renal secretion is usually increased. The nursing infant may be impressed by the bromated milk of its mother.

Bromism.—This term has been applied to the effects of chronic poisoning by the bromides through overdosing or overlapping dosage. In this condition all the untoward effects noted above are intensified. The principal changes observed are an unpleasant bromic fetor of the breath, with reddened and swollen fauces, and eruptions of acne which may pustulate, abscess, or become ulcerated. Sometimes erythematous or eczematous lesions prevail. Bodily and mental exercise is imperfect, the victim shows

feeble intellectuality, weak memory, confusion of statement or slow and stammering speech, or incoherence in diction, indulges in meaningless or silly laughter, has cold skin and extremities, is breathless and easily fatigued upon exertion, tremulous and uncertain in locomotion, and has a complete repression of the sexual function with genital relaxation. Disordered menses are common; as is pulmonary and gastric catarrh, with diarrhœa or constipation. A lethargic, sleepy state approaching beastiality predominates, and finally some of these wrecks of humanity lapse into a fever and coma and death mercifully removes them.

Therapy.—*External.* Owing to its property of blunting the sensibility of the mucous membranes bromide of potassium may be sprayed upon the fauces and pharyngeal vault to facilitate the use of the laryngoscope, the passage of the lavage tube, and of esophageal bougies; and for the introduction of instruments into the urethra. Cocaine has now largely displaced it for this purpose; but where that obtundant cannot be used or where it is especially dangerous, as it is sometimes in the urethra, the potassium salt may be substituted. Its external use in ointment for the reduction of goitre has been entirely superseded by iodine. Solutions of the salt, and sometimes an ointment, will give relief from the intense itching of pruritus ani, and particularly when associated with anal fissure.

Internal. Bromide of potassium is an important but much abused medicine. It is sedative and hypnotic. The specific purpose of its employment is to control irritation of the nervous system, with or without spasms, in the robust individual, with full and strong circulation and easily excitable musculature. It is never a good remedy for the debilitated and anemic, but for the sthenic conditions arising in the plethoric individual. Though not an analgesic, it helps one to bear pain, or even gives relief from pain when it is due chiefly to nervous excitation. Keeping these facts in mind it is not difficult to apply this medicine without harm, provided thought and care be used in considering the limitations of the patient.

The great field for potassium bromide is in spasmodic disorders in full blooded, excitable persons. It is generally conceded to be the most successful agent for the control of epilepsy. Occasionally a case is cured by it, but as a general rule it is only a controlling medicine limiting the frequency and force of the attacks. Unfortunately it brings some of the beneficiaries almost to the verge of bestiality in order to control the seizures and keep them in abeyance. If any other agent can be found to check the convulsions it should be used in preference to a bromide pushed to the limit, yet no other agent is so universally used nor so successful as this one. Extreme care then should be exercised in its use, employing no more of the salt than is absolutely needed, for it is a melancholy fact that physicians often carry to excess the employment of an effective agent until its legitimate use becomes an abuse. Bromide of potassium is pre-eminently one of the abused medicines. Unquestionably potent in epilepsy and often the only effective drug, we cannot expect it to cure when the malady depends upon organic lesions or tumors, nor upon unrectified sexual disorders, as phimosis, or other surgically remediable conditions. But in cases where there is extreme susceptibility to external impressions together with plethora, or where the trouble is precipitated by mere genital irritation, or fright, or irritability

of the cerebral cortex, bromide of potassium offers the only and best means of controlling the seizures known to medicine of to-day. From fifteen to forty grains, well diluted, may be given four times a day, and continued until the system is saturated, which will usually be apparent from the induction of acneiform eruptions, dullness, and the beginning stages of symptoms of depression. Then smaller doses may be given daily and even after long lapses between attacks, or when the disorder is apparently cured it is advised to continue the drug in small amounts for several years. Give it in combination with stomachics and tonics, as calumba, or if any heart irritability develops and we are obliged to continue the drug, digitalis may be used to support the cardiac function. When epilepsy is well under control it is advisable to occasionally omit the drug for a brief period to rest the system and especially the digestive organs from its influence. Small doses of arsenic are credited with preventing or lessening the tendency to acne. Bromide of potassium is more effectual in *grand mal* than in *petit mal.*

Bromide of potassium is an admirable temporary remedy to control or assist in controlling the convulsions of childhood, especially those dependent upon disorders of the gastro-intestinal tract and dentition. There are usually the bromide indications present—cerebral fullness and plethora. Removing any irritating material from the stomach and bowels (by enema), the following may be given to control and to prevent a return of the attack: ℞ Potassium Bromide, ʒj; Specific Medicine Lobelia, Specific Medicine Gelsemium, aa, fl ʒj; Water, q. s., fl ʒiv. Mix. Sig.: One teaspoonful every five minutes until the spasms are controlled; then every two hours for a day. These spasmodic attacks often usher in the fevers of childhood, or occur during their progress. In such instances by reducing the blood pressure and the frequency of the circulation and allaying the nervous hyperæsthesia it proves an arterial sedative and assists to a quick recovery. Small doses sometimes allay vomiting due to irritability of the gastric mucosa; and in the enteralgia of children, with intense colicky pain and contracting or knotting of the intestines, purely nervous in character and with spasm threatening, it is very prompt in giving relief. Spasmodic esophageal stricture is sometimes relieved by it. In tetanus and tetany it is a useful drug, though in the former its use must be coupled with that of the more powerful antispasmodics, as chloral and chloroform. Even then but little hope should be held out in a disorder so universally fatal. Large doses may be given per rectum usually in combination with chloral hydrate. In tetany (or tetanus neonatorum) the dressing of the cord should carefully be attended to, and the bromide given to control as far as possible the spasmodic condition. In puerperal convulsions it may be employed in conjunction with veratrum, both of which are indicated when the circulation is full and vigorous. Alone, it has little value in this disorder.

Bromide of potassium is one of the most frequently employed agents for the relief of nocturnal seminal emissions when occurring in the full-blooded excitable individual. It does not benefit, but on the contrary may do harm, to the pale, bloodless person with general relaxation and cold, clammy extremities. It renders the best service when the victim is in otherwise fairly good health, but who from lascivious dreams, vascular excite-

ment, and nervous irritability of the ejaculatory ducts is an easy prey to confirmed spermatorrhœa. The venereal excitation may approach that of satyriasis, and not infrequently in nymphomania it is our best remedy. It is, therefore, a drug for sexual hyperæsthesia with determination of blood to the genitalia. Rather full doses, twenty to forty grains, well diluted, may be given four times a day, or sufficient to control the cases in hand.

Hysteria is relieved by this salt when dependent upon sexual excitement of the type described and when accompanied by facial muscular twitching, and abdominal or uterine throbbing. It is the best agent we have used for the "hot flushing" and other nervous phenomena complained of by plethoric women during the menopause. Small doses only are required. It is one of the best drugs to control chordee during or following an acute gonorrhœa, and priapism occurring in infants and youths is subdued by it.

Bearing in mind the specific indications, the drug is especially effective in nervous palpitation of the heart, in the night terrors of children, vomiting of pregnancy (occasionally) when purely nervous and not due to stomachic wrongs, somnambulism, tinnitus from the effects of quinine, in the delirium of fevers, in cerebral and cerebro-spinal meningitis, in urethral fever from operative measures, and in the amblyopia of the intemperate. It is conceded one of the best remedies for sea-sickness, beginning its use in small doses several days before sailing. Elixir of bromide of potassium will often quickly overcome drunkenness and is a favorite remedy in the Eastern States for mastering the effects of a "jag". In delirium tremens it is a most important remedy, when vascular and nervous excitement is great; it will do damage in the opposite condition. In this disorder it acts well with chloral, from twenty to forty grains of the former being administered with ten to twenty grains of the latter, as needed. Thus it is effectual where opium would be contraindicated. Bromide of potassium sometimes relieves in acute mania, with violent manifestations; and it is often a reliable medicine in acute puerperal mania.

Congestive headache is relieved by potassium bromide, but it must be remembered that a bromide habit is readily acquired. Therefore, if other agents can be employed for victims of oft-repeated headaches the bromides may well be omitted. The same is true of insomnia. When of a sthenic type, but without headache, it assists the patient to sleep by calming the irritability and subduing the activity of thought, which alone is often responsible for the sleeplessness. It is most applicable when insomnia is due to worry, grief, or mental strain, or work; it is less effective and nearly always fails when insomnia is due to pain, though it helps one to feel the pain less acutely. An exception is where the pain is that of migraine, and in some cases of neuralgia. It is hypnotic but not analgesic.

Headache due to eye-strain is relieved by ten to fifteen grain doses every three hours, but as Foltz cautions, its protracted use is charged with causing recurrent corneal ulcers. Combined with caffeine it is frequently a most effective remedy for migraine.

Many physicians use bromide of potassium (or of sodium) in whooping-cough, irritable laryngeal cough, in laryngismus stridulus, and in the laryngeal crises of locomotor ataxia; and in acute laryngitis to limit the appreciation of pain and allay hoarseness.

POTASSII CARBONAS.

Potassium Carbonate, Salt of Tartar. (Formula: K_2CO_3).

Description.—An odorless, granular, white powder having a strong alkaline taste; very deliquescent and feebly soluble in cold and hot water, but insoluble in alcohol. *Dose*, 5 to 30 grains well diluted with water.

Specific Indications.—Leaden pallor of tongue and mucosa; muscular tremors; debility all out of proportion to other symptoms; articular pain.

Action and Toxicology.—Carbonate of potassium, in concentrated solution, is an energetic caustic poison, destroying any portion of the gastro-intestinal canal it may reach. The chief symptoms are burning pain, prostration and vomiting (sometimes bloody), and if death does not occur shortly extreme emaciation may ensue, accompanied by constant irritation of the stomach and bowels. The antidotes are mild acids, as lemon juice or vinegar, to destroy the alkaline properties of the carbonate, or fixed oils to saponify the salt.

Therapy.—*External.* Sometimes used in baths and in ointment or lotion for obstinate skin disorders with excessive seborrhœa.

Internal. Antacid and diuretic. Though seldom used, it may, like the bicarbonate, be employed to overcome acidity of the stomach, and in urinary disorders showing a disposition to lithæmia. It is indicated occasionally in conditions presenting the indications noted under Specific Indications (see above). It should always be well diluted. Potassium carbonate is chiefly used in the preparation of the citrate and other salts of potassium.

POTASSII CHLORAS.

Potassium Chlorate, Chlorate of Potash. (Formula: $KClO_3$.)

Description.—Permanent, lustrous and colorless, prismatic crystals or plates, or a granular white powder, without odor and having a saline taste. Soluble in cold and hot water or glycerin, but almost insoluble in alcohol.

Caution.—Potassium chlorate should not be heated, triturated, or concussed with any organic substance (sugar, cork, dust, powdered vegetable drugs, etc.). A safe rule to observe is never to triturate it in dry form with anything that will burn. It is a powerful oxidizer and under such circumstances will explode. *Dose*, 1 to 15 grains.

Specific Indications.—Puerperal sepsis; troubles arising from decomposition of fragments of placenta, blood-clots, and absorption of lochia; fetid lochia; fetid breath; fetor as of decaying flesh; pallid tongue, with pale or bluish membranes; ulceration of mucosa with foul discharges; tender gums and mouth with fetid salivation; tongue dirty, coated and thick; cough with purulent expectoration; discharges with a cadaverous odor.

Action and Toxicology.—Potassium chlorate is stimulant and disinfectant to mucous surfaces. It breaks up readily in the presence of septic material, oxygen being liberated. The old idea that it yielded oxygen to the blood is now thoroughly disproved and it is known to be eliminated unchanged from the body, and that largely by the salivary glands. Small doses have no effect upon the stomach and bowels; large doses may occasion very painful gastro-enteritis with prolonged vomiting. Death has resulted from this effect, and then the mucosa has been swollen and ecchymotic. In the blood, large doses cause disintegration of the corpuscles and the formation of methæmoglobin, giving to that fluid a chocolate color.

Death may occur from asphyxia, from weakness of the heart, or more generally from uræmia. While large doses may kill in a few hours, generally death takes place after several days. Usually actual primary nephritis does not occur, but the uræmia and secondary nephritis result from the blocking up of the renal tubules with broken-down brown masses of destroyed blood discs. After death the liver, kidneys, and spleen may be found enlarged, softened, and gorged with disintegrated blood. Poisonous doses produce headache, faintness, great thirst, intense renal pain, vomiting, chills, reduced temperature, anemia, jaundice and cyanosis. The urine is almost or fully suppressed, dark chocolate in color, albuminous, and loaded with casts and broken-down discs. The treatment consists in washing out the stomach preferably with alkaline solutions, the use of such lenitives as mucilages of elm or acacia, and white of egg, or milk, cardiac and respiratory stimulants, and after subsidence of the active symptoms, the free use of fluid to rid the kidneys of obstructive débris. Hot baths aid the treatment.

Therapy.—*External.* Chlorate of potassium when used in solution is one of the best of local cleansing and deodorizing agents for the purpose of removing unhealthy deposits giving off a cadaverous odor. Its local action is greatly aided by the coincident use of small doses of it internally. Not only is it an antiseptic, but it has gently stimulating properties. It is especially applicable where the mucous surfaces show an accumulation of vitiated secretion, mucous patches, follicular ulcerations or any unhealthy and foul-smelling deposit. It may be sprayed upon the parts in pharyngitis, follicular tonsillitis, ulcerated tonsils, and in combination with tincture of chloride of iron and hydrochloric acid, it is highly efficient as a local medicament in diphtheria. The nascent chlorine liberated is the medicinal factor. In sluggish ulcerations it may be *dissolved* with hydrastin (never mix dry for fear of explosion) or with specific medicine hydrastis, in plenty of water.

Locally, potassium chlorate solution forms one of the most useful washes for ulcerated mouth, especially that due to drugs or local irritants. It is particularly useful in mercurial stomatitis and salivation, but small amounts should be used lest the renal condition already produced by the mercurial be aggravated by the additional untoward action of the chlorate. When aphthous ulceration is due to a disordered stomach, or from the effects of too free use of canned tomatoes and similar foods, it is of less value than hydrastis, neutralizing cordial, phytolacca, berberis, internally, or coptis or ligustrum locally. But for tissue destruction of the mucous tracts due to inflammation, infectious or otherwise, potassium chlorate may be relied upon with confidence. In many cases of sore throat, mucous patches, tonsillar exudation, and sore mouth and tongue of smokers it does excellent service. The hydrastis and chlorate wash is more effective than the latter agent alone. For the distressingly painful and destructive aphthæ of consumptives preventing the patient from taking food, Locke advised ℞ Saturated Solution of Potassium Chlorate, fℨiv; Colorless Hydrastis, Glycerin, Syrup of Morphine, Simple Syrup, aa, fℨj. Mix. Sig.: One teaspoonful every three hours. A wash of it is soothing for ulceration due to the pressure and abrasion from false teeth. For local use upon the mouth and throat a solution of 1 to 50 or 1 to 100 is sufficiently powerful.

Internal. Almost every writer upon materia medica has given the classic caution that potassium chlorate provokes renal irritation and inflammation. It is unquestionably true that the *large* doses, as was the case with most chemicals when this agent was first employed, caused the poisonous symptoms so frequently quoted. Quoted, we say, because we believe it more largely a quotation than a statement of actual experience. Almost daily employment of this drug for a quarter of a century gives one the right of testimony, and we can testify solemnly and truthfully that, when used as the Eclectic uses it, it has never caused the least aberration of the renal function. It takes but little of potassium chlorate to be effective, and from five to twenty grains to four ounces of water, given in teaspoonful doses every two, three or four hours, as indicated, is sufficiently strong for remedial purposes. A long experience with such solutions has given us confidence in its efficacy and no fear of harmful results.

It is for its internal action that we value potassium chlorate most. There is nothing under the sun, when given internally, so certain to remove stench from secretions of the body which have undergone changes and have a decidedly cadaveric odor. No matter what the diseased condition, when we encounter this odor the patient is given potassium chlorate; invariably good results are obtained so far as the deodorizing process is concerned. Without question it is the best agent for offensive lochia, and, while it has been our policy not to give medicines without a positive indication, in obstetrics we have made it the exception to give a small quantity of potassium chlorate to forestall the odor so likely to supervene. There is no need of the obstetric chamber smelling like a charnel house if the patient be given a small portion of this medicine during the puerperium. When there is known to be a retention of placental and other débris, these should, of course, be removed mechanically.

In offensive leucorrhœa we have found potassium chlorate equally effective. In foul-smelling diarrhœa it has occasionally been useful, but not of such value as in other odoriferous states. We have known it to correct fetid urine in cystic inflammation, and this, too, without the least damage to the kidneys. Notwithstanding its safety in general when given in doses above advised, one should be cautious about using it during or after scarlet fever, lest nephritic complications ensue, or when the mucous tissues are dry and secretion is scanty. In the use of potassium chlorate we have always been guided by the cadaverous odor—a veritable stink reminding one of the dissecting room—of the secretions and excretions. We have never found it of value to supply oxygen to the blood in anemia, as some have reported.

POTASSII CITRAS.

Potassium Citrate. (Formula: $K_3C_6H_5O_7.H_2O$.)

Description.—Prismatic, transparent crystals, or a granular, white powder, devoid of odor but having a cooling, saline taste; deliquescent in the air; very soluble in water; freely dissolving in glycerin but not alcohol. *Dose*, 5 to 30 grains.

Preparations.—1. *Liquor Potassii Citratis*, Solution of Potassium Citrate. *Dose*, 1 fluidrachm to 1 fluidounce.

2. *Potassii Citras Effervescens*, Effervescent Potassium Citrate. *Dose*, 60 to 120 grains.

Specific Indications.—Irritability and acidity of the stomach in marasmic infants.

Action and Therapy.—Solution of potassium citrate is an agreeable refrigerant preparation often used as a vehicle for the arterial sedatives. It acts mildly upon the bowels, kidneys, and skin, increasing their secretions. In the blood it is converted into a carbonate, thus increasing the alkalinity of that fluid and rendering acid urine alkaline. It may be used to allay irritability of the stomach, as an adjuvant to other medicines in acute bronchitis, and in moderate doses of the salt (20 grains) in incontinence of urine due to concentrated acid urine. We have found this salt in very dilute solution one of the best agents to overcome repeated vomiting from irritability and acidity of the stomach in marasmic infants. It should be well diluted. As a fever drink it may be used freely, first sweetening it to taste. An agreeable extemporaneous form is prepared by adding the juice of one-half lemon and a half ounce of water to a solution of one drachm of potassium bicarbonate in four ounces of cold water. Mix the two solutions and administer while effervescing. Uric acid diathesis may be improved by potassium citrate, which may also be employed as a refrigerant diuretic in fevers, post-scarlatinal dropsy, and in general dropsies due to cardiac weakness. It is, however, of no special value in dropsy of the body cavities.

POTASSII ET SODII TARTRAS.

Potassium and Sodium Tartrate, Rochelle Salt. (Formula: $KNaC_4H_4O_6+4H_2O$.)

Description.—Transparent, colorless crystals, or a white, odorless powder, having a cooling, saline taste. Slightly efflorescent in dry air; very soluble in water, and almost insoluble in alcohol. *Dose*, 60 to 180 grains.

Preparation.—*Pulvis Effervescens Compositus*, Compound Effervescing Powder (*Seidlitz Powder*). *Blue Paper* contains Potassiun and Sodium Tartrate, and Sodium Bicarbonate. *White Paper* contains Tartaric Acid. *Dose, a set of the two powders*, each to be separately dissolved in a half glass of water and the two solutions mixed just before swallowing.

Action and Therapy.—A mild, cooling laxative in moderate doses; purgative in large doses. It should be given well diluted with water. When administered in a small dose, well diluted, it is absorbed and renders the urine alkaline. Hence it is used sometimes in acidity of the urine (avoiding it if phosphates are present), and in acute rheumatic fever, with acid urine. Rochelle salt is an ingredient of the well-known Seidlitz Powder (see above) used largely by the laity in lieu of magnesium sulphate, when a brisk, watery catharsis is desired.

POTASSII HYDROXIDUM.

Potassium Hydroxide, Caustic Potash, Potassium Hydrate, Potassa. (Formula: KOH.)

Description.—An odorless, dry, white or nearly white salt, occurring in fused masses, or in sticks, of a hard and brittle consistence and breaking with a crystalline fracture. Upon exposure to air it absorbs carbon dioxide and moisture and becomes deliquescent. It is very soluble in water and alcohol. Owing to its tendency to destroy tissues and form soaps with fats it should be handled with great caution.

Preparation.—*Liquor Potassii Hydroxidi*, Solution of Potassium Hydroxide. (Liquor Potassæ, Solution of Potassa.) *Dose*, 5 to 30 minims largely diluted.

Specific Indications.—Frequent and difficult urination with sense of perineal constriction; strangury; leaden pallor of tongue and mucosa;

feeble, tremulous muscles; fullness of muscular tissue; debility all out of proportion to the diseased condition.

Action and Toxicology.—Salts of potassium, if given for any great length of time or in enormous doses, have a distinctly depressive action upon the heart and the central nervous system. This effect is widespread, extending even to the muscular system. The cord seems especially susceptible to their influence, and both motor and sensory depression results; the brain also suffers to some extent, while in ordinary medicinal doses, not too long administered, such effects are not often met with, still it is well to bear in mind this depressive influence in cases of weak heart or in various disorders of that organ.

Caustic potash is powerfully corrosive. Applied to soft animal structures it first dehydrates and then rapidly disorganizes them, combining with the fatty constituents to form soap. This is followed by extensive inflammation and subsequent deep sloughing. Swallowed it is an intense irritant and corrosive poison, causing intense burning pain throughout the gastro-intestinal tract, acrid caustic taste, vomiting of alkaline and bloody material, diarrhœa, delirium, spasm, and cold, clammy surface. Death quickly follows if the dose is large and not vomited; if not immediate it may result later, even after months, from the effects of inflammation and ulceration, and subsequent stricture of the esophagus, causing starvation. The long-continued use of potassa may occasion symptoms resembling scurvy.

The chemical antidotes to poisoning by caustic potash are the acids, as vinegar and lemon-juice. Acids in themselves corrosive should be avoided. Fats and oils may be administered freely to combine with the potash and to protect the tissues. Opiates may be given to allay pain. The subsequent gastro-enteritis may be treated in the usual way with lenitives and protectives. Emetics should not be used lest rupture of the softened tissues takes place.

Therapy.—*External.* Caustic potash and the liquor potassæ are used to soften corns, bunions, warts, and callosities, and to destroy fungous granulations and soften the nail in the treatment of overgrown toe-nail. Added to sulphur ointments it materially aids in softening the burrows in the treatment of scabies.

Internal. Caustic potash, in the form of liquor potassæ, is sometimes administered as an antacid, for which it is less useful than the bicarbonates. It is more effectual as an agent to alkalinize the urine, and as such has been employed considerably in the tendency to uric acid formation, in acidosis, in rheumatism and gout, and in the strangury accompanying gonorrhœa. On account of its power to lessen the viscosity of secretions, it is sometimes added to cough mixtures to be administered in chronic bronchitis. As a rule, it should be given midway between meals.

POTASSII HYPOPHOSPHIS.

Potassium Hypophosphite. (Formula: KPH_2O_2.)

Description.—Very deliquescent, opaque, white plates or crystalline masses, or a granular, white powder; without odor but having a sharp saline taste. Very soluble in water, and less freely in alcohol. *Dose*, 2 to 15 grains.

Specific Indications.—Atony, with pallor of tongue and mucosa;

muscular soreness, tenderness, pain or lameness; chronic cough, with pectoral pain and irritation, pulse weak and rapid; emaciation.

Action and Therapy.—Potassium hypophosphite improves digestion, blood-making, and nutrition; and relieves tenderness and lameness of the muscles. In the form of the syrup it is quite popular as a remedy for laryngeal and bronchial irritation with cough, and as a reconstructive for those inclined to phthisis and chronic bronchitis.

POTASSII IODIDUM.

Potassium Iodide, Iodide of Potash. (Formula: KI.)

Description.—Colorless and transparent, or more or less opaque or white cubical crystals, or a granular, white powder, having a pungent, saline, afterwards bitterish or metallic taste; slightly deliquescent in moist air; permanent in dry air. Very soluble in water and glycerin, and somewhat less in alcohol. *Dose*, 1 to 20 grains (usual dose from 1 to 5 grains, preferably at meal time).

Specific Indications.—Pale, leaden-colored, rather full tongue; dryness of the mucosa; nocturnal pains; tertiary and late secondary syphilis, with above-mentioned tongue; blue line on gums (chronic lead poisoning); adenopathy.

Action.—Iodide of potassium is quickly absorbed and very rapidly eliminated, though a small portion may be retained in the body; and if repeated in overlapping doses, or in continuous use, it may become cumulative. It has been detected in the urine within a quarter of an hour after its administration. While most of the drug is eliminated in the urine, it may also pass into the saliva, perspiration, tears, and the milk. A moderate dose with most individuals merely disturbs digestion, and augments the output of urine. Large doses, however, cause nausea and vomiting, with burning in the stomach, and diarrhœa. A not uncommon effect of even small doses in susceptible individuals is a condition simulating "summer catarrh". Being excreted by the air passages partially it sets up a most violent coryza, with bronchorrhœa and swelling and congestion, and even inflammation of the pharynx and larynx and conjunctivæ. The action may be so severe as to inflame the frontal and maxillary sinuses and to produce hoarseness, shortness of breath, œdema of the larynx, impairment of sight and speech, and a paretic condition of the organs of speech. This peculiar form of *iodism* once experienced is not readily forgotten, and sleep is practically out of the question while it is in force. According to some prescribers small doses more often excite these symptoms than fuller doses, and if the drug be given with the meai it is less apt to cause "iodide punishment". Iodide of potash is usually well tolerated, however, if syphilis is present, though even that disease does not always prevent iodic discomfort.

Iodine, and the iodides in particular, if given for a long period produce a train of symptoms known as *iodism*. This is usually present in the coryzal form, with frontal headache, sneezing, soreness of the throat, lachrimation, and ptyalism, but it may also produce decided skin and constitutional symptoms. Thus it is not uncommon for indurated acne to appear, and less commonly urticaria, watery or bloody blisters, and iodic purpura. Hydroa, or very painful large watery or bloody blebs, sometimes form, with fatal consequences. Iodic skin lesions often show a violaceous

coloration so striking that once seen it is easily identified afterward. As a rule iodism subsides rapidly upon the withdrawal of the drug. Sucklings may become emaciated from the milk of mothers who are being treated with iodides.

In some instances, probably through a toxic effect upon the thyroid glands, decided symptoms of Grave's disease, cardiac palpitation, tachycardia, tremor, loss of weight, and excessive sweating have come from the abuse of iodides; and cases of atrophy of the mammæ and testicles, and profound cachexia and emaciation have been reported from their immoderate use. Iodide of potassium is likely to do harm when the kidneys are chronically diseased, and at all times should be cautiously used when renal inactivity is pronounced. While so small a dose as five grains may produce great discomfort, as high as five hundred grains have been given daily in cases of tertiary syphilis, without iodic aggravation.

Therapy.—Iodide of potassium is a widely used and useful remedy, but one recklessly given and often without rhyme or reason. When not indicated, or better when contraindicated, as in chronic nephritis, it may do irreparable harm. It is, perhaps, one of the best of so-called alteratives or agents which "increase retrograde metamorphosis", forming in some instances, as in metallic poisoning, double salts, and in others being eliminated with the broken-down tissues of the body. When its action is pushed beyond the therapeutic limits then it attacks the healthy tissues and does harm. The axiom laid down by Scudder is a fairly good one, though not always absolutely to be followed; i. e., that it should be selected when there is a "broad, pallid, leaden-colored tongue, rather full. With this indication, it is a very certain antisyphilitic, whilst with a red and contracted tongue it is pretty sure to do the patient injury."

The use of the term antisyphilitic as here employed should be regarded relatively. The drug is probably not an antisyphilitic in the sense that it destroys the treponema, but in effect it proves a remedy against conditions prevailing late in the course of the disease. Were it a true antisyphilitic it should prove effective in the very inception of the infection. As a matter of fact it is never useful or effective in the early stage of syphilis, but in the tertiary stage, or in the later period of the secondary stage just as it is about to pass into tertiary, is when iodides prove most valuable medicines. In the parasyphilitic conditions—in syphilis of the nervous system it is the most commonly used drug. Thus it is relatively useful in arteriosclerosis, paretic dementia and locomotor ataxia, but it is successful only in so far as there is still sound tissue to act upon. It is frequently used by syphilologists as a diagnostic measure in syphilis, lesions promptly responding if that disease is present.

While this is unquestionably the most generally useful drug in syphilis (acting equally as efficiently as mercury and without the damage caused by the latter), it is likely to do harm if given in the early stage, and this point cannot be too strongly emphasized. It does no good so far as the disease is concerned, and produces a profound effect, not needed at this period, upon the tissues. Good care and hygienic measures are to be preferred. In the late secondary stage it may be given preferably in syrup of stillingia, with or without iris, phytolacca, berberis aquifolium, or podophyllum, as in-

dicated. At this period the doses need not be large. In the tertiary manifestations, however, full doses are required and are well tolerated, especially if there are ulcerative and periosteal complications. Even here iodism should be avoided, if possible, lest it add to the damage already caused by the ravages of the disease. Ulcerative syphilitic destruction, caries, periostitis, nocturnal "bone-pains", nocturnal neuralgias, gumma, fibrous thickenings and deposits, inflammatory in character, about the joints, upon nerve trunks and tendons, and in the periosteal membranes, and in all disorders having as an underlying basis syphilitic dyscrasia come well within the field of usefulness of this salt. Almost invariably the indications as given by Scudder lead to the best results.

Iodide of potassium has been largely used in so-called chronic rheumatism. It is of no value in acute articular rheumatism. In rheumatoid arthritis it is frequently effective, and it or the syrup of the iodide of iron is among the valuable medicines in gonorrhœal arthritis. Probably most of the cases of chronic rheumatism benefited by the drug are those having a syphilitic taint or dependent upon chronic metallic poisoning. Occasionally it is of value in sciatica and lumbago, but fails oftener than it succeeds in giving relief.

Iodide of potassium is the most certain remedy in chronic lead, mercurial or arsenical poisoning. Often the conditions are at first aggravated, but eventually yield to the drug. Not more than twenty grains should be given in a day.

Glandular swellings in ill-nourished children frequently yield promptly to this salt, or better to syrup of iodide of iron. In actinomycosis it is usually the drug of preference. Owing to its probable action upon fibrous tissue it has been advised in hepatic cirrhosis, but apparently does good only in the early stages; similarly it may do good in chronic interstitial nephritis. In parenchymatous nephritis it is sure to damage the patient, and should not be used even though syphilis is present. Nor should it be given to consumptives in whom it usually proves an aggravation, except in the rarer cases of fibrous phthisis.

Iodide of potash is invaluable in recurrent bronchial asthma, with tenacious secretions and the presence of Curschmann's spirals. It is a good intercurrent remedy to ward off the attacks, as it is also in angina pectoris, being second only to the nitrites in preventing the recurrence of seizures of the last-named affection. In asthma it liquefies the secretions and thus aids expectoration. For this reason it is also frequently serviceable in dry forms of cough, and in congestive and purulent types of bronchitis. As soon as the secretions become attenuated the dose should be lessened lest debility ensue. Probably this salt is as useful as any agent in promoting absorption of excessive fluid in pleurisy and pericarditis. For mechanical effects and on account of a thickening effect upon the blood it has been advised in aortic aneurism, but has proved of but little value.

When skin diseases depend upon a syphilitic origin this agent is one of the most certain to give relief. Even in those conditions denominated scrofulous—in which glandular enlargements accompany the skin lesions—it is a most effectual drug. Eye disorders—corneal ulcer and rheumatic and syphilitic iritis—are well treated with five grain doses of the iodide at

each meal. Iodide of potassium may be given, well diluted, in water or milk, or in syrup of stillingia, sarsaparilla, or wild cherry.

POTASSII NITRAS.

Potassium Nitrate, Nitre, Saltpetre. (Formula: KNO_3.)

Description.—Large transparent, colorless, six-sided crystals, or a white, crystalline powder; no odor; of a saline taste imparting coolness to the mouth. Very soluble in water; less soluble in alcohol (620). *Dose*, 2 to 15 grains.

Specific Indications.—Renal atony, with scanty urine and difficult breathing; acute rheumatism with excessive tenderness; aching testicular pain; asthmatic breathing (vapor).

Action.—Potassium nitrate disorders the blood when taken in full doses for a continued period of time, that medium becoming thinner, the white corpuscles increased, and the red discs rendered paler. General lassitude, fatigue on exertion, mental and physical indisposition, with a weak and slow pulse, bruised sensation in the joints, and a disposition to drowsiness have been observed from it. One ounce in concentrated solution has caused death by inducing violent gastro-enteritis.

Therapy.—*External.* Inhaled from burning bibulous paper saturated with a solution of this salt and dried, great relief is often experienced in spasmodic asthma. Together with lobelia, stramonium and similar plants, it is an ingredient of many popular "asthma powders" and "cigarettes".

Internal. Potassium nitrate is diuretic and refrigerant, and is sometimes of value in acute inflammatory rheumatism, with excessive tenderness. It should be given in five to twenty grain doses, largely diluted. King valued it for aching of the testicles in masturbators and those addicted to excessive venery.

POTASSII PERMANGANAS.

Potassium Permanganate, Permanganate of Potash. (Formula: $KMnO_4$.)

Description.—Slender crystals, dark purple in color, almost opaque by transmitted light, and of a blue, metallic lustre in reflected light; no odor; and when dissolved having a sweetish, afterwards disagreeable, nauseous, astringent taste. Freely soluble in water, but decomposed by alcohol. *Dose*, 1 to 2 grains.

Caution.—This salt must not be brought into contact, *either dry or in solution*, with organic or readily oxidizable substances. (See *Potassii Chloras.*) It should only be used in simple solution in water; although pills made up with kaolin or paraffin have been advised. Mixed in any other way *it is likely to explode.*

Specific Indications.—*Locally.* Flabby, pale, unhealthy and half-rotten granulations; fetid surfaces; swollen, infiltrated surfaces with lack of reparative power; low inflammations, with infiltration of connective tissues; inflammation, with low vitality and inclination to slough; watery, ichorous pus; to abort boils and felons (used very early); phlegmonous erysipelas.

Internally. Atonic amenorrhœa, with mental depression and pelvic weight.

Action.—Used full strength upon most tissues this salt is caustic; and concentrated solutions may cause dermal irritation and corrosion. When the skin is broken a hot, smarting pain is felt. In contact with proteids it is quickly decomposed, giving up some of its oxygen, in consequence of which

it proves a powerful oxidizing poison to protoplasm. Owing to its easy decomposability it does not penetrate deeply, but upon the surface of the skin and mucosa it acts as an efficient but fleeting antiseptic. It is a good deodorizer, and to some degree a disinfectant. Internally it produces a disagreeable heartburn and gastric uneasiness with a sense of substernal pressure. Its taste is sweetish and disagreeable, and on account of its easy destructibility it is not readily absorbed. It stains the tissues and fabrics brown.

Therapy.—*External.* Used locally, in proper dilution, potassium permanganate is stimulant, deodorant, and disinfectant. As a general cleansing antiseptic for surface purposes it is safe and preferable to many of the more toxic agents. As a local wash in all forms of sore throat—specific, diphtheritic, or otherwise—this agent is one of the very best. If its use is begun early in threatened tonsillar inflammation, within four or five hours after the first uncomfortable sensations are felt, it frequently aborts a distressing tonsillitis. If that disorder gets a half day's start, it has been our experience that few, if any, agents are capable of aborting it. But it may be aborted if permanganate of potash is used at the very outset. A weak solution of not over 2 per cent strength may be used as a spray or wash every three hours. We do not favor gargling on account of its violence and the congestion caused by such an effort. Gargles often defeat their intended purpose. The act of gargling causes a strangulation of parts with increased congestion. Rinsing does no such harm. Swabbing the parts is liable to cause trauma, and thus an added complication is to be feared. As a wash, water should be made slightly more than a decided pink coloration with the salt, and used preferably slightly warmed. Where cold is desirable it may be used in iced water. Unfortunately its peculiar taste is decidedly nauseating to some, but most persons can use it without discomfort. Once every three hours is usually sufficiently often to use it unless the parts are extremely fetid, when every hour is none too often. In case tonsillitis progresses, no better wash can be used to control local conditions, and the same may be said of it in other forms of throat inflammation, as quinsy, pharyngitis, faucitis, and in the more infectious diphtheria. Nothing more quickly removes stench and causes quick sloughing of tonsillar exudates than this agent.

Potassium permanganate should be used by irrigation (1 part to 2,500 of water) in gonorrhœa in both male and female. It may be necessary to use a mild silver solution at first, but the bulk of the treatment should be by irrigation with solution of this salt. It is painless in less than 5 per cent solutions and effectively deodorizes and cleanses the diseased parts. For leucorrhœa it is one of the most effective of douches, but to cure must be persisted with for some time. Potassium permanganate is used to cleanse minor wounds, to dress sluggish and foul-smelling ulcers of any type, and to deodorize stinking feet (bromidrosis). It is useful also, used almost full strength, to relieve the distress of rectal ulcer or fissure, and in weaker dilutions to cleanse the parts when discharging, and to remove odor and allay itching. Many cases of ivy poisoning may be quickly cured by a lotion of about 5 to 10 per cent strength; moreover, it promptly allays the burning and itching. It is one of the agents which gives local relief in erysipelas.

Weir-Mitchell is authority for the statement that the permanganate is effective as an antidote to snake bite. It should be applied in powder before the venom is absorbed, or immediately injected in strong solution into and around the wound. We rely upon it wholly for the cleansing of carbuncles and have had old tibial ulcers of years' standing heal under its local application, together with rest in bed. In carbuncle a solution of one part to two of water may be injected after thorough incision. Some treat felons in a similar manner. Ozæna, cancer of the tongue, necrosis of the jaw, stomatitis, the angina of scarlatina, etc., are similarly cleansed and deodorized by this solution. Gauze saturated with a strong solution may be used to mask the odor of carcinoma. As a deodorant, stimulant to sluggish tissues, and to alleviate inflammation of the throat and other mucous passages, we regard it as indispensable. Its greatest drawback is its staining quality, but the stains may be removed from garments and other fabrics by a very dilute solution of sulphuric acid or of oxalic acid, quickly and thoroughly rinsing them afterward to prevent destruction of the materials.

Some surgeons use potassium permanganate for hand sterilization previous to operating. The hands and forearms are thoroughly scrubbed for several minutes, then rinsed and immersed in a saturated solution of potassium permanganate for three minutes. This stains a deep brown. This color is then removed by immersion in a warm saturated solution of oxalic acid. Many follow this (Welch-Kelly method) with rinsing in sterile water and subsequent immersion in a solution of mercuric chloride (1 to 5,000). The latter procedure is apt to be hard on the hands.

Scudder (*Specific Medication*) defined the indications for the topical uses of this salt as follows: "Where the tissues are swollen from infiltration into the connective tissue. In case of wounds we will notice that the edges are swollen and the process of repair stops. The infiltration continuing, the pus becomes watery and ichorous, granulations pale and flabby; the parts separate, and finally slough. In inflammation we have very nearly the same indications—the inflammation always being of low grade, and showing infiltration of cellular tissue." Locke (*Materia Medica*) briefly puts the indications as "fetid surfaces with granulations half rotten and half alive."

Internal. This salt is seldom used internally by Eclectic physicians. It has, however, sound endorsement as a chemical antidote for the vegetable alkaloids, notably morphine, and for poisoning by phosphorus. If used at once it may destroy morphine before it can be absorbed. If already absorbed it may destroy that which is excreted into the stomach afterward—a process which is known to take place with many poisonous substances. A solution of two grains for every grain of morphine swallowed is advised. Rarely it may be used in amenorrhœa from cold or from fright, when there is mental depression and pelvic weight. Usually the dose required (about 2 to 5 grains) is sufficient to cause gastric irritation and severe pain, so that there is no advantage to be gained, especially when there are so many safer and pleasanter specific agencies to restore retarded menses. It has also been advised to reduce excessive fat and for the flatulent dyspepsia, often suffered by the obese. For most internal purposes it is not a safe and satisfactory agent.

PRINOS.

The bark and berries of *Prinos verticillatus*, Linné (Nat. Ord. Aquifoliaceæ). Moist woods and streams throughout the United States. *Dose* (bark), 5 to 60 grains.

Common Names: Black Alder, Winterberry.

Principal Constituents.—Resin, tannin, and an amorphous, bitter principle.

Preparation.—*Tinctura Prini*, Tincture of Prinos (Bark, ℥viii to Alcohol (76 per cent), Oj). *Dose*, 5 to 60 drops.

Action and Therapy.—Black alder is tonic, astringent and alterative, and especially effective as the latter. Many alterative syrups contain black alder. The berries are cathartic and vermifuge. Tincture of black alder and specific medicine hydrastis form an excellent tonic in atonic dyspepsia, when debility is marked and there is a tendency to diarrhœa.

PRUNUS VIRGINIANA.

The stem-bark of *Prunus serotina*, Ehrhart (*Prunus Virginiana*, Miller), collected in the autumn and carefully dried (Nat. Ord. Rosaceæ). Woods of eastern half of the United States. *Dose*, 5 to 60 grains.

Common Names: Wild Cherry, Wild Black Cherry Bark.

Principal Constituents.—*Amygdalin* (acted upon by water yields hydrocyanic acid, oil of bitter almond, and glucose); *emulsin* (destroyed by heating), and tannic acid.

Preparations.—1. *Specific Medicine Prunus*. *Dose*, 5 to 60 drops.
2. *Syrupus Pruni Virginianæ*, Syrup of Wild Cherry. *Dose*, 1 to 2 fluidracnms.

Specific Indications.—Weak, rapid circulation; continuous irritative cough, with profuse muco-purulent expectoration; cardiac palpitation from debility; cardiac pain; dyspnœa; loss of appetite and gastric irritability.

Action and Therapy.—Wild cherry is an excellent sedative and tonic, quieting irritation of the mucosa, terminal nerves, and lessening violent cardiac action dependent upon weakness. When a tonic and sedative is desired that will not unduly excite the circulation, wild cherry is a most useful drug. As such it may be used in atonic dyspepsia, and in convalescence from fevers and inflammations, especially after pleurisy, pneumonia, and la grippe. While the syrup is an effectual and popular preparation, the *cold* infusion is better for these purposes.

Wild cherry in syrup is an admirable sedative for cough, acting much like hydrocyanic acid and even better, besides it is more controllable. For the cough of phthisis it is one of the most satisfactory agents, and the syrup is in common use as a vehicle for other cough remedies. In phthisis it not only relieves irritation and cough, but it gives a certain amount of power, and restrains colliquative sweating and diarrhœa. Wild cherry may be used in most cases of irritation of the mucosa with or without hypersecretion in any part of the body—pulmonic, gastro-intestinal and renal.

Wild cherry is very efficient in uncomplicated palpitation of the heart, and where digitalis is required it lessens the irritative action of the latter upon the stomach. Wild cherry would be more valued if properly prepared. The cold infusion (sweetened, if desired) should be preferred; boiling temporarily destroys its value, and unless a good quality of bark, carefully preserved, is used, the syrup may have little value.

PTELEA.

The bark of the root of *Ptelea trifoliata*, Linné (Nat. Ord. Rutaceæ). A common shrub of the United States, especially west of the Alleghenies. *Dose*, 5 to 30 grains.

Common Names: Wafer Ash, Shrubby Trefoil, Wing Seed, Hop Tree.

Principal Constituents.—Resins, a volatile oil, a berberine-like bitter, and *arginine* ($C_6H_{14}N_4O_2$).

Preparation.—*Specific Medicine Ptelea. Dose*, 1 to 30 drops.

Specific Indications.—Asthmatic dyspnœa; chronic diseases with constriction of chest and short breathing.

Action and Therapy.—Ptelea is regarded by some as second only to hydrastis as a tonic. It acts as a sedative to irritated membranes, and is said to be tolerated by the stomach when other tonics might aggravate. The field in which it has been mostly used is in convalescence from fevers, debility resulting from gastro-intestinal irritation, and in asthmatic seizures accompanied by a sense of constriction in the thorax.

PULSATILLA.

The recent herb of *Anemone Pulsatilla*, Linné, and of *Anemone pratensis*, Linné, collected soon after flowering (Nat. Ord. Ranunculaceæ). Southern Europe and Asia.

Common Names: Pasque-Flower, Passe-Flower, Meadow Anemone, Wind Flower.

Principal Constituents.—A yellow, acrid oil, yielding anemone camphor, a vesicating principle easily decomposing into *anemonin* ($C_{10}H_8O_4$) and *isoanemonic acid.*

Preparation.—*Specific Medicine Pulsatilla. Dose*, 1/10 to 10 drops. (*The usual form of administration:* ℞ Specific Medicine Pulsatilla, gtt. v to xxx; Water, q. s., fl℥iv. Mix. Sig.: One teaspoonful every 2 or 3 hours.)

Specific Indications.—Nervousness with despondency, sadness and disposition to weep, without being able to tell why, or to weep while asleep; unnatural fear; fear of impending danger or death; morbid mental excitation associated with physical debility; marked depression of spirits; insomnia, with nervous exhaustion; pain, with debility; headache, with nervousness, not dependent on determination of blood to the head; neuralgia in anemic nervous subjects; mental depression and gloom over reproductive wrongs and disturbances, as spermatorrhœa, and tardy and insufficient menstruation (with sense of fullness and weakness in back and hips); nervous collapse, due to overwork, sexual indulgence, masturbation, or to the excessive use of tobacco; amenorrhœa, with chilliness and mental depression; dysmenorrhœa, with gloomy mentality and chilliness; pain from exposure to winds; epiphora; styes; deep-seated heavy pain in the globe of the eye; jumping toothache from abscess near the dental pulp; stomach disorders from indulgence in pastries and fats; pasty, creamy, or white coating upon the tongue, with greasy taste; thick, bland, and inoffensive mucous discharges; alternating constipation and diarrhœa, with venous congestion.

Action.—Topically applied, the fresh plant of pulsatilla is irritant, and, if kept long in contact with the skin, may vesicate. When chewed, it produces a benumbing sensation and tingling formication, somewhat like that produced by aconite or prickly ash. Taken internally in overdoses, it is a gastric irritant, producing a sense of rawness, burning pain in stomach, with endeavors to vomit, all accompanied by marked prostration. A sense of constriction and tightness of the chest, with chilliness, marked

weakness, and some congestion, has been produced by large doses. Full doses depress the action of the heart, lower arterial tension, and reduce temperature. Sensory and motor paralyses have followed very large doses of pulsatilla, while toxic doses may produce mydriasis, stupor, coma, and convulsions. In medicinal doses, pulsatilla increases the power and regulates the action of the heart, and gives a better character to the pulse rate, particularly slowing the irritable, rapid and feeble pulse due to nervous depression. It improves the sympathetic system and cerebral functions, and especially strengthens sympathetic innervation, this action being very marked in troubles of the reproductive organs of the male and female.

Therapy.—*External.* The value of pulsatilla has been emphasized in "jerking" or "jumping" toothache, usually due to the formation of a pus cavity near the nerve. Full strength specific medicine pulsatilla, or diluted one-half with water, is applied besides giving the drug internally. This treatment is also commended as "especially useful in inflammations caused by dead teeth, and the inflammatory, painful, and unpleasant conditions of the pulp cavity in those in which the nerve has been destroyed."

Internal. Though not of Eclectic origin, pulsatilla is one of the most important medicines in Eclectic therapy. For certain nervous phases, both in acute and chronic diseases, no remedy can exactly duplicate its action. It is most largely employed in nervous conditions of the debilitated, particularly women and children, in mental disorders, and in stomach derangements and disorders of the reproductive tract with debility and faulty nutrition of the nerve-centers. All through the indications for pulsatilla run *depression and irritability* with melancholy and sadness, and a disposition to look upon the dark side of life. With this gloomy mentality there is more or less of restlessness. The patient is easily inclined to weep, is unsettled and the mind wanders. Thought is concentrated with difficulty, the pulse is soft, open, and weak, and altogether the patient is miserable and despondent. Scudder, who introduced it into Eclectic practice, declared its most important use is to allay irritation of the nervous system in persons of feeble health, thus giving sleep and rest, preventing unnecessary expenditure of nerve force, and by this means facilitating the action of tonics and restoratives. He found it to be most certain in its action in feeble women and men who have become nervous from sedentary habits or mental overexertion, as well as in the nervousness and restlessness of masturbators, or persons addicted to the excessive use of tobacco. He also declared it *the* remedy for nervous women when there is debility and faulty nutrition of the nerve centers.

Pulsatilla, though a remedy of wide applicability, is particularly adapted to conditions in which the depressed mind is a prominent factor. A gloomy mentality, a state of nerve depression and unrest, a disposition to brood over real or imagined trouble, a tendency to look on the dark side of life, sadness, mild restlessness, and a state of mental unrest generally denominated in broad terms "nervousness", are factors in the condition of the patient requiring pulsatilla. As stated before, the pulsatilla patient weeps readily, and the mind is inclined to wander—to be unsettled. The pulse requiring pulsatilla is weak, soft, and open, and the tissues have a tendency to dryness (except when the mucous tissues are discharging

thick, bland material), and about the orbits the parts appear contracted, sunken, and dark in color. The whole countenance and movements of the body depict sadness, moroseness, despondency, and lack of tone. Hysteria of the mild and weeping form may be a symptom. The complex is one of nervous depression, the nutrition of the nerve centers is at fault. With such symptoms, pulsatilla may be confidently prescribed in the conditions and disorders enumerated in this article.

Pulsatilla may be given to induce sleep when there is great exhaustion and opiates are inadmissible. If the insomnia depends upon determination of blood to the brain, pulsatilla will not relieve, but when due to nervous exhaustion it is a prompt remedy to give rest, after which sleep obtains. Where sleep is disturbed by unpleasant dreams, and the patient awakens sad and languid, pulsatilla should be given.

Pulsatilla has a large field of usefulness in troubles incident to the reproductive organs of both sexes. As an emmenagogue, it serves a useful purpose in amenorrhœa in nervous and anemic subjects, with chilliness a prominent symptom. When menstruation is suppressed, tardy or scanty from taking cold, or from emotional causes, pulsatilla is the remedy. In dysmenorrhœa, not due to mechanical causes, and with the above-named nervous symptoms, few remedies are more effective. Leucorrhœa, with a free, thick, milky or yellow bland discharge and pain in the loins, and particularly in scrofulous individuals, calls for pulsatilla. It is useful in mild forms of hysteria, where the patient is weak and weeps, has fears of impending danger, and passes large quantities of clear, limpid urine, and menstruation is suppressed. The long-continued use of pulsatilla as an intercurrent remedy is accredited with curative effects in uterine colic, but it is of no value during an attack. Pulsatilla frequently relieves in ovaritis and ovaralgia with tensive, tearing pain. Sluggish, ineffectual, and weak labor-pains are sometimes remedied by this drug, though it is seldom used for this purpose since more active agents have come into use. It frequently alleviates pain when dependent on or associated with debility, and sometimes when due to acute inflammation. In epididymitis and orchitis, whether due to gonorrhœal infection or to metastasis from mumps, it is quite universally employed by practitioners of all schools of medicine. Here the dose should be large. The dark-red, congested, enlarged, and sensitive testicle indicates it. It relieves the pains of orchialgia, and subdues mammary swelling from the metastasis of mumps. Pulsatilla increases sexual power, but lessens morbid sexual excitement. It is especially valuable in relieving urethral irritation and consequent spermatorrhœa and prostatorrhœa. In these troubles it overcomes the nervous apprehension so frequently a troublesome feature. It also alleviates the nervous irritability accompanying or produced by varicocele. In gonorrhœa, particularly of the chronic type, pulsatilla is of value when the urethral membrane is swollen. Many unpleasant conditions of the urinary apparatus are relieved by pulsatilla, as frequent but ineffectual attempts at urination, the bladder giving a sensation as if bloated; dribbling of urine from movement, the dysuria of pregnancy, and in involuntary micturition from colds or from nervous debility.

Pulsatilla is a useful remedy in headache of various types. It relieves

frontal headache from nasal catarrh; nervous headache, particularly when due to gastric disturbances, with greasy taste; menstrual headache, with chilliness and suppressed menses; bilious and gastric headaches, of a dull and heavy character, with greasy taste and nausea; and headache due to uterine irregularities or to a rheumatic diathesis. These headaches are all of anemic character—the opposite of those relieved by gelsemium. Constipation in the hysterical female sometimes yields to nux vomica and pulsatilla, and the latter has a pleasing action in some forms of indigestion and dyspepsia. These are the cases in which there is a thick, creamy paste upon the tongue and a greasy taste. Such troubles are frequently brought about by indulgence in pastries and fatty food. Pain is not marked, but there is pyrosis and greasy eructations, gastric distention, uneasy gnawing sensations in the stomach, and chilliness may be a pronounced symptom. The patient is nervous, sad, and may have a soft, yellow diarrhœa. For such cases pulsatilla is an excellent remedy. It is also said to relieve alternating constipation and diarrhœa with venous congestion.

Though ordinarily not a remedy for acute inflammations (contraindicated in gastro-intestinal inflammation), there are some conditions where small doses of pulsatilla are beneficial when the usual symptoms calling for the drug are present. These are acute inflammation of the nose, fauces, larynx, or bronchi. It is especially effective in the secondary stage of acute nasal catarrh, when the naso-pharynx is affected and there is a sense of rawness and moisture, and an abundant discharge of thick, yellow, bland, inoffensive mucus or muco-pus. Pulsatilla often serves a good purpose in asthma superinduced by pregnancy, or by suppressed menses, and it favorably influences whooping-cough in properly selected cases. So-called "stomach cough" is frequently cured by pulsatilla. For the secondary stage of common colds, when the Eustachian tubes feel stuffed and occluded, with a moderate degree of deafness, pulsatilla alternated with gelsemium provides a most beneficial treatment.

Pulsatilla is a very important remedy to control the catarrhal symptoms of the exanthemata; it also allays the irritability frequently accompanying these disorders. In measles, it has done good service in checking the coryza and profuse lachrimation, as well as the dry, tight, painful cough, and when retrocession of the eruption has taken place, it has reversed this unpleasant condition. It relieves the nervous irritability in varicella.

Pulsatilla is a most efficient drug in real and imaginary cardiac affections. It has proved useful in cardiac hypertrophy and in dilatation of the venous heart. It is especially effective in functional heart disorders with giddiness, imperfect voluntary motion, impaired vision, and with a symptom described as a sense of pressure over the larynx and trachea, with imperfect respiratory movement, and sense of impending danger; these symptoms are not unfrequently associated with functional heart disease, dyspepsia, uterine disease, or over-excitation of the sexual system, and are generally very unpleasant and annoying. It often relieves that form of venous congestion which stops short of inflammation, as in threatened ovaritis, orchitis, varicocele, and crural phlebitis. Varicocele and other varicoses are sometimes improved by its administration with other indicated remedies. Its

chief advantage, outside of some control over the venous structure, is the relief it gives from the nervous complications. It has been used to good advantage for the relief of the nervousness attending hemorrhoids, and has some control over the venous congestion causing them. Pulsatilla gives prompt relief in earache, brought on by cold, wet, and exposure to winds. For this purpose it is the best drug we have used. There is an absence of fever, the pulse is open and soft, the child sobs, the face is pale, the tissues full and waxen, the pain is intense and frequently paroxysmal and tearing in character—evidently a neuralgic condition, for physical signs of local disturbance are seldom observed. In purulent otitis media, with thick, yellow, bland discharge, and impaired hearing and tinnitus aurium, pulsatilla is the indicated remedy.

One of the earliest uses of pulsatilla was for the relief of "amaurosis, cataract, and opacity of the cornea", conditions in which the reputed value of pulsatilla is very much overrated. There is a condition, sometimes known as "nervous blindness", which has been benefited by pulsatilla, and this is probably that formerly referred to under the elastic term amaurosis. Pulsatilla has an excellent record as a remedy for hordeolum or "stye". It also relieves promptly when the conjunctiva is hyperæmic and vision weakened, especially after reading, or from sexual abuse or sexual excesses, and in profuse lachrimation from exposure to winds or when in the wind. It should be used locally (gtt. x to aqua, fl℥ij) and also given internally in small doses. In chronic conjunctivitis, with bland, yellow discharges, in scrofulous individuals, or due to the exanthemata, and in ophthalmia with like discharge, pulsatilla has been used with success. It relieves deep-seated, heavy pain in the globe of the eye, and has been recommended in inflammation of the lachrymal sac.

Pulsatilla has been used with varying degrees of success in rheumatism, when the pains were shifting and relieved by cold and aggravated by warmth. Depression of spirits is here a prominent feature. It has also aided in restoring the flow of milk in agalactia in nervous and fear-depressed women, whose breasts were painful and swollen. The dose of specific medicine pulsatilla is from a fraction of a drop to ten drops, administered in water; of anemonin, 1/20 to 1/4 grain.

PYROLA.

The whole plant of *Pyrola rotundifolia*, Linné (Nat. Ord. Ericaceæ). Damp and shady woods in the United States. *Dose*, 5 to 60 grains.

Common Names: Canker Lettuce, Shin Leaf, False Wintergreen.

Principal Constituents.—*Ericolin, arbutin, urson*, tannic, gallic and malic acids, etc.

Preparations.—1. *Infusum Pyrolæ*, Infusion of Pyrola (℥j to Water, Oj). *Dose*, 1 to 2 fluidounces.

2. *Tinctura Pyrolæ*, Tincture of Pyrola (℥viij to Alcohol (76 per cent), Oj). *Dose*, 1 to 60 drops.

Specific Indication.—Irritation of urinary tract.

Action and Therapy.—*External.* A splendid but much neglected agent in infusion, as a wash for sore throat and aphthous ulcerations of the mouth.

Internal. As it has similar properties to uva ursi and chimaphila and exerts a similar antiseptic action, it is of much value in urinary disorders with irritation and tendency to ulcerations and sepsis. The urine contains much mucus and sometimes blood.

QUASSIA.

The wood of *Picrasma excelsa* (Swartz), Planchon (Nat. Ord. Simarubaceæ). A tall tree of Jamaica and neighboring islands. *Dose*, 10 to 30 grains.

Common Names: Quassia, Quassia Wood, Bitter Wood.

Principal Constituent.—The bitter substance *quassiin* (quassin).

Preparations.—1. *Infusum Quassiæ*, Infusion of Quassia (℥j to ℥xij of cold water). *Dose*, 1/2 to 2 fluidounces.
2. *Specific Medicine Quassia. Dose*, 1 to 30 drops.

Action and Therapy.—Quassia is a bitter stomachic and tonic. A cold infusion (1 to 100 of cold water) used as an injection is one of the most useful agents to remove ascarides. An acidulated infusion may be employed to lessen the craving for alcoholics. For this purpose the wood may be extracted with vinegar and administered in drachm doses in a glass of water. Specific medicine quassia may be given in doses of one to thirty drops, in water, for impairment of the appetite in feeble and emaciated persons. Cold infusions of the chips are to be preferred to hot, as less extractive matter is drawn out.

Quassia is not without danger, and established doses must not be exceeded. Even rectal injections of it have caused collapse in a child. Having no tannin, quassia may be given with iron, if desired.

QUERCUS.

The bark of *Quercus alba*, Linné (Nat. Ord. Cupuliferæ). Indigenous. *Dose*, 5 to 20 grains.

Common Names: Oak Bark, White Oak Bark.

Principal Constituent.—Tannic Acid (quercitannic acid).

Preparations.—1. *Decoctum Querci*, Decoction of Oak Bark (Quercus ℥j, Water Oj). *Dose*, 1 to 2 fluidounces; used chiefly locally.
2. *Specific Medicine Quercus. Dose*, 5 to 20 drops.

Specific Indications.—Relaxation of mucosa, with unhealthy discharges; ulcerations with spongy granulations.

Action and Therapy.—*External.* Oak bark depends chiefly for its virtues upon the tannin it contains. However, it sometimes proves more agreeably effectual than the acid when used in decoction or poultice upon ill-conditioned ulcers, with stinking, spongy granulations, in gangrene, as an astringent for relaxed uvula, with flabby or ulcerated sore throat, and as an injection for leucorrhœa, prolapsed rectum and hemorrhoids. The bark of *Quercus tinctoria*, Bartram (Black Oak), has similar properties, but is objectionable on account of its staining quality.

Internal. Oak bark is astringent. Combined with aromatics, as cinnamon or nutmeg, the decoction is often an effectual means of checking serous diarrhœa and intestinal hemorrhages. In small doses it is a general tonic for debility, with tendency to relaxation of tissue and looseness of the bowels. In dysentery with a tendency to chronicity and not yielding readily to ordinary treatment the bowels may first be flushed by means of castor oil or magnesium sulphate, after which the decoction of oak bark may complete the cure.

QUININA.

Quinine. (Formula: $C_{20}H_{24}O_2N_2 . 3H_2O$.)
An alkaloid derived from the bark of Cinchona species (Nat. Ord. Rubiaceæ).

Description.—An odorless, white powder, of micro-crystalline character, having an intensely bitter and persistent but slowly developing taste, and losing water of crystallization in dry air. It is very soluble in alcohol, chloroform, or ether, but almost insoluble in water. On the latter account the salts of quinine are preferred for medicinal use. *Dose*, 1 to 20 grains.

Preparations.—1. *Quininæ Sulphas*, Quinine Sulphate. Light, white, silky, lustrous crystals, easily compressible, without odor and having a very bitter, persistent taste. In dry air it loses its lustre, and exposed to light becomes brownish. Soluble in glycerin, less readily in alcohol, and sparingly in water. *Dose*, 1 to 20 grains. Large doses of this and the following salt are only employed in malarial fevers.

2. *Quininæ Bisulphas*, Quinine Bisulphate. Colorless or whitish, odorless needles or crystals, very bitter, efflorescent, and gradually turning yellow in the light. Very soluble in water, less so in glycerin or alcohol. *Dose*, 1 to 20 grains.

3. *Quininæ Hydrochloridum*, Quinine Hydrochloride (Quinine Chloride). Silky, white, lustrous needles, without odor and of an intensely bitter taste. Efflorescent. Readily soluble in chloroform, alcohol, or glycerin, and somewhat less in water. *Dose*, 1 to 20 grains.

4. *Quininæ Dihydrochloridum*, Quinine Dihydrochloride. A very bitter, odorless, white powder, very readily soluble in water and less so in alcohol. *Dose*, 1 to 20 grains.

5. *Quininæ Salicylas*, Quinine Salicylate. Odorless and colorless, bitter, needle crystals. It is unaffected by air, but may become pinkish with age. Scarcely soluble in water, but fairly soluble in alcohol, glycerin, or chloroform. *Dose*, 1 to 20 grains.

6. *Quininæ Tannas*, Quinine Tannate. A non-crystalline, light-yellow or yellow-white, odorless powder, having practically no taste, or but a slight bitterness with astringency. It is but slightly dissolved by water, but a little more readily by alcohol. *Dose:* As it is usually administered to children, the dose ranges from 1 to 5 grains. It is an unsatisfactory preparation.

7. *Quininæ Hydrobromidum*, Quinine Hydrobromide (Quinine Bromide). Very bitter, odorless, light, silky, white crystals; efflorescent; soluble readily in alcohol, chloroform, glycerin, and less readily in ether or water (about forty parts). *Dose*, 1 to 20 grains.

8. *Quininæ et Ureæ Hydrochloridum*, Quinine and Urea Hydrochloride (Quinine and Urea Chloride). Colorless crystals, or a granular, white, very bitter powder, unchangeable in the air. Very easily dissolved by water or alcohol. *Dose*, 1 to 20 grains; for hypodermatic use 15 grains, employing not more than one dose a day.

Specific Indications.—Periodicity, pulse soft and open, tongue moist and cleaning; skin soft and moist, and nervous system free from irritation; intermittent and remittent fevers; periodical neuralgia; enfeebled innervation.

Action.—Quinine is a general protoplasmic poison; it is, moreover, antiputrefactive and antiseptic. Unlike other powerful alkaloids, instead of showing a selective affinity for a single or few forms of living matter it acts upon the protoplasm generally of a great majority of the forms of living organisms, first stimulating and interfering with nutrition and subsequently depressing and accomplishing their destruction. Thus it acts upon the amœbæ and upon infusoria, and greatest of all, upon the sporozoön, which is the cause of malarial intermittent fevers—the plasmodium malariæ. Cinchona bark was applied to ulcers for antiseptic and antiputrefactive purposes by Sir John Pringle as early as 1765. In various strengths, quinine checks fermentation in milk, urine, alcoholic fluids, etc., and prevents decomposition of the same.

Upon denuded surfaces, quinine acts as an irritant. To the taste quinine sulphate is extremely bitter. It does not fully represent Cinchona, whose associated principles possess properties not present in quinine alone. In small doses, quinine is a nervous and vascular stimulant. In large doses, it is a sedative and muscular and cardiac depressant, and if given in suf-

ficient amounts, which, however, must be very large, it is capable of producing death. Upon entering the stomach, quinine is dissolved by the gastric fluid, such portions as are not dissolved passing into the intestines, where the alkaline juices also precipitate such portions of the dissolved salt as may come into contact with them. In small doses, the movements of the stomach are increased, and the flow of gastric juice augmented. Large doses check the flow of the latter and cause irritation of the stomach. If the stomach be already irritable, even small doses of quinine or cinchona increase the difficulty. In immoderate quantities, it first constipates and then causes diarrhœa. Upon the blood, quinine appears to impress the hæmoglobin, impairing its function, with the result of lessening the oxidizing (ozonizing) powers of the blood. The activity of the white blood-corpuscles is also said to be inhibited or lessened, and the discs even destroyed by this salt. It has also been shown that the amœboid movements of these bodies are inhibited. Small doses increase the action of the heart, while large doses depress it. The feeble cardiac movements, from large doses, are due to its action upon the cardiac motor ganglia; the vaso-motor system is also depressed by it. In health, very little effect is produced upon the body-heat by quinine, though in febrile conditions it tends to bring down the temperature. How this occurs is still a matter of debate. Probably it has no specific effect in reducing heat production and increasing dissipation, but acts rather through its killing power over the infective organisms causing the fever, as in malarial attacks; for it is certainly an uncertain antipyretic in other febrile disorders. Quinine has a tendency to restrain the cutaneous secretions.

The cerebrum is stimulated by small doses of quinine, and either a hyperæmic or congested state of the brain induced. Large doses, however, produce a partial anemia of the organ, due to contraction of the arteries and feeble heart-action. After death the brain is found to be engorged with blood. Deafness is a common result after the injudicious use of quinine, but it is seldom permanent. The optic nerve and retina, through ischæmia, become perfectly white, resembling white atrophy, and temporary blindness results. Occasionally, permanent atrophy of the nerve, with blindness, remains. Upon the spinal cord, the chief effects are a lessening or abolishment of reflex excitability. This is attributed not to a primary action upon the cord, but to stimulation of Setchenow's center of inhibition, situated at the base of the brain. Quinine first stimulates the lungs, increasing the respiratory functions. Toxic doses, however, produce dyspnœa and a variety of abnormal respiratory movements, finally ending in death, with symptoms of asphyxiation. The spleen is contracted by quinine, and upon the uterus it probably has no power to originate contractions, though it appears to assist normal uterine contractions when they have once begun. For this purpose it is valued in feeble and intermittent uterine action during labor. Notwithstanding this, it is the general opinion that it is a perfectly safe agent to administer in threatened abortion, due to malarial influence, or occurring in malarial districts.

Quinine rapidly diffuses itself into the blood in proportion to the quantity taken. It is found in all the secretions, the tears, the saliva, milk, sweat, and urine. Though some of it is probably eliminated by the bowels,

and a large portion undergoes destruction in the body, the chief amount—at least nearly one half—passes out by way of the kidneys (unchanged and as dihydroxyl quinine), hence the irritant effects sometimes produced upon the urinary tract. In acute inflammation of the renal organs, it increases the difficulty and may give rise to complete suppression, or to retention of urine. Small doses increase the elimination of urea, uric acid, and creatinin, while the excretion of these products is diminished by larger doses. It may appear in the urine in fifteen minutes, but is not wholly eliminated for about three days; hence the danger of overlapping doses. Quinine occasionally produces skin eruptions, among which may be mentioned erythema, urticaria, herpes, roseola, and rarely purpura.

Small doses of quinine, frequently repeated, act as a stimulant tonic, strengthening the pulse, increasing muscular force, and invigorating the tone of the nervous system. In some persons it induces headache, nausea, or irregular action of the bowels, effects generally obviated by combining it with morphine; and these disturbances will be almost certain to follow if gastro-enteric irritation preëxists. Large doses, as twenty grains, or one-half drachm, produce many unpleasant symptoms, and ought never to be used, except in the malignant conditions hereafter mentioned. Among these may be named sickness and pain at the stomach, mental confusion, giddiness, flushed countenance, palpitation, a sense of fullness, throbbing, and distention in the head, intense weighty headache, ringing in the ears, vomiting, numbness in the feet, twitchings of the limbs, deafness, blindness, delirium, and nervous excitation and restlessness. If this amount be administered for several days, muscular debility, with tremulousness, unsteady gait, somnolence or apathy, obtuse sensibility, and dilated pupils, may also be present. In toxic doses, deafness and blindness may be complete, the limbs become powerless, and unconsciousness supervene. Upon discontinuing the use of the quinine, the effects gradually pass off; occasionally, however, the aural and ocular disturbances persist for some time if the drug has been long administered. It is seldom that the severer symptoms, above mentioned, are observed, for, as soon as slight cinchonism has been produced, known by giddiness, a buzzing or ringing in the ears, slight headache, etc., the drug is usually discontinued.

Therapy.—*External.* Quinine sulphate is decidedly antiseptic, and an aqueous solution of it (1 to 60, 100, or 200) has been advised as a spray for the relief of hay-fever. Many popular hair tonics contain quinine. The bisulphate is sometimes employed as an injection in gonorrhœa, and a solution of the sulphate may be applied to diphtheritic deposits. By far the most important use of quinine locally is that peculiar to Eclectic practice, quinine inunction, as follows:

Quinine Inunction.—How much quinine is absorbed or whether any changes take place in the salt when used by inunction are not definitely known, but therapeutic results are very apparent and the method is extremely satisfactory. The administration of quinine to children is not agreeable to them. The various concealing mixtures have little to recommend them. Admixture with some disguisers unquestionably produces some changes in the character of the medicament, and results are not nearly so satisfactory as by the old-fashioned method of inunction. We find it the

method of administering quinine to children, in whom small doses only are required, and we have never observed any of the unpleasant head symptoms from it when so employed. In the use of quinine by inunction we observe the same specific indications as for its internal administration—a soft skin, often inclining to moisture; a soft, moist tongue, open pulse and febrile exacerbations of a decidedly remittent or intermittent type. We often find the periodic character in ailments not distinctly malarial, as in acute bronchitis and broncho-pneumonia. When malaria is manifestly present, then it is especially desirable. It is in children chiefly that we employ inunction, while for adults we prefer the internal use of an acid solution of quinine.

The inunction is prepared and used as follows: Mix two drachms of quinine sulphate with two ounces of ointment of rose water. Apply about a level teaspoonful, divided into parts, to the skin of the axilla or the fold of the groin, where it is readily absorbed, two or three times a day. Benzoinated lard or aromatized goose fat may be used instead of cold cream, but the latter is an agreeable and effective base; petrolatum is less desirable. The physician who has never used quinine by inunction will be agreeably surprised at its efficacy. Besides, most people are apt to feel that much more good is being accomplished when local treatment is advised, and it forestalls their desire to apply all sorts of objectionable topical applications.

Internal. Formerly the known physiological action of quinine shed but little light upon the practical application of the drug. No absolute explanation was given of its manner of action in malarial and other periodical fevers. That it antagonized a miasmatic poison was generally accepted; and it had been hinted at by scientists of world fame and obscure doctors of the backwoods, that these fevers might be caused by an animalcule (as it was then called), a parasite, or some low form of organic life, the multiplication of which quinine prevented, and the destruction of which it accomplished. The matter was finally definitely settled, however, by the discovery, by Laveran, in 1890, of the sporozoön—the *Plasmodium malariæ*—and the proof that it was the infecting agent. Binz, in the late sixties, declared, what had been long known to practical bedside clinicians, that the infecting agent (whatever it might be) was probably antagonized by quinine. In spite of the long use of cinchona and its alkaloids in intermittents this specific toxicity toward the provocative cause was but slowly accepted. Later it was shown experimentally that quinine could destroy it in the human system, as well as in the test-tube, and that when isolated these protozoa have been killed by so dilute a solution as one part of quinine in 20,000 parts of water.

Quinine is *the great remedy for malarial or intermittent fevers.* It is now seldom employed in other fevers without periodicity, except as a tonic to prevent prostration. Malarial fevers are now known to be caused by the infective process of the life cyle of the Plasmodia of malaria, three types of which are concerned in the infection, with the result that three types of disease result. The protozoa enter the red blood discs, mature, bud, and escape as spores into the blood-plasma. Enormous broods of these new bodies now infest the life stream ready in turn to plunge into new red corpuscles. This process causes the phenomena of chill and fever and reaction and intermission, the two former occurring when sporulation is

taking place and the current is filled with the invading hordes, and the latter when they are safely ensconced in the safe haven of the intact corpuscle. The chill and fever recur at regular intervals just in proportion as the proper stage of parasitic development and splitting up is reached. When infection is single, simple fever results; when double or multiple, irregular paroxysms and intermittency occur. Quinine can attack these parasites with greatest effect when the spores are out of their retreat in the cells, and if supplied to the blood a few hours before a paroxysm is expected it is ready at hand and able to attack and destroy the invading parasites. Sometimes this may be accomplished just after the temperature begins to fall, provided the drug can be absorbed quickly enough. The rational procedure in treatment then is to keep the blood charged with quinine, for in this way not alone are most of the newly liberated spores crippled and destroyed, but the few remaining protozoal spores that have escaped and are ready to renew their ravages in a subsequent invasion are trapped and destroyed also. Given after all active paroxysms have been subdued and the sporozoa apparently subjugated, it is the better part of wisdom to administer enough of quinine to keep the blood saturated and ready for defense for several weeks to come. This takes but small doses and is not apt to harm the body; but is very likely to rid the stream of the last invading parasite. Fortunate it is that a general protoplasmic poison like quinine is capable, in sufficient doses, of coming into direct contact with and killing the lower form of life in the blood stream of a higher form without toxic damage to the latter.

Physicians of all schools of practice unite in pronouncing quinine a most important and indispensable drug. Few will deny, we believe, that it is also a medicine capable of harmful results if carelessly and indiscriminately employed. The nervous system in particular is so pronouncedly impressed by quinine and its salts that the best judgment and care should attend their exhibition. Despite the fact that quinine has been used so long, and often so successfully as a medicine by the physicians of all schools, in the hands of no class of practitioners has it attained the degree of success that it has in the practice of Eclectics. This we assert with pardonable pride and at the risk of being accused of medical egotism.

In the earlier days of Eclecticism quinine was administered by Eclectic physicians "in all febrile diseases, without regard to the violence of the fever, or to the degree of congestive enlargement of the liver or spleen". The aim was invariably to affect the head—to produce cinchonism. This also has been essentially the practice of members of the Regular school. The Eclectics, however, were careful to advise that previous to its administration "any symptoms of irritability, wakefulness, or restlessness must be first subdued". In this, at least, they approached the present use of the drug and the proper conditions for its administration as now viewed by the specific medicationist. Such was its status in the past, but since the development of specific medication there has been a better understanding of the adaptability of quinine to disease conditions; and while regarded at the present day as an invaluable remedy when indicated, we find far less use for it than formerly in Eclectic therapeutics. The practice of promiscuously and unqualifiedly prescribing quinine as a febrifuge, as an antiperiodic,

or as a tonic, is confined chiefly to the few who have not yet learned the better methods of specific medication for direct effect. When indicated, quinine, like any other indicated drug, should act kindly and pleasantly. The system should not be subjected to great shock in order to produce its remedial effects. In rare conditions only, such as congestive chills, is it necessary to carry the patient to cinchonism. In truth, the most salutary results are always attainable when the drug acts gently and without disturbing the head or sense of hearing.

In the Eclectic school, from the very first periodicity has been the keynote for the employment of quinine. To-day the modern Eclectic knows that periodicity alone will not guide him unerringly to the selection of quinine as the specific remedy. There must be something more, some associated condition besides periodicity to enable him to cure or ameliorate with quinine. The study of specific medication at the hands of masters long ago gave him the indications—not periodicity alone—which may require quinine, arsenic, boletus, ceanothus, or some other so-called antimalarial drug—but *periodicity, with a soft and open pulse, a moist and soft skin, a moist and clean or cleaning tongue, and a nervous system free from marked irritation.* The older Eclectics many times practiced specific medication unwittingly, though they had not yet formulated the indications, when they employed the emetic or the diaphoretic preparatory to administering quinine. They knew that it acted best after such preparation, and they tacitly recognized the indication when they directed "that any symptoms of irritability, wakefulness, or restlessness must first be subdued" before giving the drug, though they erred, as we now look at the matter, in believing, as did their rivals in practice, that the head must be affected daily in order to cure the sick with quinine.

On the contrary, observation has shown that when quinine is employed where there is marked nervous excitation, a dry tongue, a dry skin, and a frequent hard and sharp pulse, an aggravation of conditions is most likely to result. This, at least, has been the repeatedly recorded experience of specific medicationists.

Malaria uncomplicated, fortunately, most often presents the proper conditions for quinine; hence the frequency of cures with it. Ordinarily it is the best remedy for congestive chill and for malignant intermittents. Should the stomach be in a condition not to receive it kindly, it may be administered with capsicum or black pepper. To be effective large doses of quinine must be used, and without regard to time, ten to twenty grains quarter-hourly until forty to sixty grains are taken (Locke). In remittent fever, when indicated, it is a prompt and decided remedy given in the larger or smaller doses during the intermission accordingly as the disease is of a malignant or non-malignant type. It is seldom indicated and is of rare usage in typhoid fever, lest it damage the vascular and nervous systems, irritate the stomach and bowels, and provoke diarrhœa. With pronounced indications, as given above, however, it proves a safe and valuable remedy in this disease, and is then usually effective in small doses combined with hydrochloric acid. This is especially true if prostration be imminent, as it is also in pneumonia—a disease in which quinine is so largely used by practitioners of the Regular school, and so sparingly employed by Eclectics. Quinine is occasionally

of value in puerperal fever, septicæmia, and diphtheria. It is particularly useful for the debility following surgical diseases, where the discharges are copious and exhausting. It also tends to check the formation of pus. Some times it is indicated in infectious and influenzal pneumonia, not for antipyretic effects, but rather for its antibacterial properties.

The mixed type of fever, known as typhomalarial, is benefited by quinine in proportion to the predominance of the malarial infection, and less effectual as the typhoid element predominates.

All agues are not cured by quinine, but as a rule, when uncomplicated they yield to it; nor is it always curative in the malarial cachexia, and it often fails when arsenic or eupatorium succeeds. Generally, however, it proves useful in disorders depending upon a malarial origin. It is useful in enlarged spleen or ague-cake. It is frequently of value in children's diseases occurring in malarial districts, particularly when periodic in type. Other diseases supervening in one subject to ague are often benefited by the judicious use of quinine. Thus it forms the whole or a part of the treatment in muscular pain, rheumatism, etc. We have had excellent results in severe rheumatic conditions of the shoulders, wrist, and fingers from the use of a weak, hydrochloric acid solution of quinine sulphate to which is added specific medicine capsicum. Quinine aids macrotys and other antirheumatics. It is a remedy for periodical neuralgia and periodical headaches. In view of their origin and the power of the drug over the plasmodia, there is now no doubt that quinine possesses prophylactic powers long claimed for it to prevent malarial manifestations.

The rule for the administration of quinine as an antiperiodic is as follows: "Whenever an acute disease exhibits periodicity, we administer the agent during the intermission, or when there is the least excitement of the circulation; but if this cannot be done, owing to the shortness of the intermission, we give it during the reaction" (Scudder, *Materia Medica*, page 436). If given when a chill is on, it is likely to aggravate it; while during the sweating stage, it is neither necessary nor productive of much good. As to the manner of administration, there is some difference of opinion—some preferring broken doses, others the single dose. Scudder, after getting the patient in the proper condition, preferred to give a single dose of ten grains in one or two ounces of water, using sufficient sulphuric acid to effect a solution. This he believed to be the most certain and pleasantest method of administration. Locke advised from fifteen to thirty grains, depending upon the condition of the patient, five-grain doses being administered during the intermission, every three hours, so that the last dose may be taken an hour before the expected chill. The following solution was recommended by Locke: ℞ Quinine Sulphate, ℥i; Diluted Hydrochloric Acid, gtt. xxx; Water, fl℥ii. Mix. *Dose*, a teaspoonful or more every three hours; each teaspoonful contains about four grains of quinine. It is still advised by some that a fifteen-grain dose be given, timed to meet the moment of sporulation (which takes place simultaneously in a single invasion), but as a rule the method of administering broken doses for continuous saturation is more often recommended and thought to be more generally effective.

That the nervous system is profoundly affected by quinine, is evident

from the great damage done by the improper and untimely administration of the drug. When indicated, however, it is one of the most important of stimulants of the cerebro-spinal centers. In many chronic forms of disease, with impaired nutrition and functional torpor, quinine, administered according to its indications, will, in small doses (1/2 to 2 grains), restore the proper innervation and aid in a cure. In fact, in chronic affections there are two main conditions in which it always does good, and those are cases with enfeebled innervation, as mentioned, and those of malarial infection, with "obscure periodicity" (Scudder). Not only does it stimulate the cerebro-spinal centers, but so impresses the sympathetic ganglia that waste and excretion are better performed, and digestion, nutrition, and blood-making are improved. Thus it is frequently combined with iron and strychnine in general debility. A useful preparation for this purpose is the "compound tonic mixture". Quinine, in small doses, is effectual in dyspepsia, depending upon a nervous derangement of the stomach. It antagonizes erysipelas. In intermittent neuralgia, with severe pain, and particularly when affecting the fifth nerve, quinine, combined with small doses of morphine, is one of the most certain of drugs. The colliquative sweating of pulmonary affections is checked by the following: ℞ Quinine Sulphate, gr. xxx; Aromatic Sulphuric Acid, fℨss; Water, fℨiv. Mix. *Dose*, a teaspoonful three times a day, the last dose being taken at bedtime (Locke). As a tonic, sulphate of quinine is useful in diseases with an enfeebled state of the system, and especially in the debility resulting from exhausting diseases; in chlorosis and in anemia it should be given with acid solution of iron or the milder scaled salts of iron. Quinine is, with some physicians, the remedy most relied upon in sunstroke.

In obstetrical practice, quinine is frequently serviceable. It may be employed to remedy irregular and ineffective pains, and where complications of a periodical nature arise. As with its antiperiodic virtues, small doses of opium associated with it increase its oxytocic power. By its tonic and contractile action, it minimizes the danger of post-partum hemorrhage.

Quinine is a much abused medicine in common colds and in influenza, often being administered without any special indications, and generally resulting in creating a sense of fullness in the head and other symptoms of cinchonism. When, however, the specific indications are present, then, as in other disorders, it renders good service.

We have had good results in the treatment of hay fever, by the internal administration of a solution of quinine in water and hydrochloric acid, each dose containing two grains of the salt, and being administered four times a day.

The dose of quinine sulphate, internally, is from one-half to three grains, repeated every one, two, three, or four hours, as the urgency of the case may require. Large doses should not be employed except in remittent and intermittent fevers, when the dose may range from five to twenty grains. A popular method of administering quinine is in capsules. This, while pleasanter, is less effectual than the acidulated solutions. A solution of quinine sulphate may be made by adding twenty grains of the salt to one fluidrachm of aromatic sulphuric acid, and, when dissolved, add two fluidounces of water. The dose is twenty drops every hour, in about one-half ounce

of water, or syrup of ginger. We prefer the solution in hydrochloric acid and water, using two drachms of quinine sulphate to four fluidounces of water, with just enough acid to insure solution. The dose is from one-half to one teaspoonful, in plenty of water. Each full dose contains practically four grains of quinine. A number of substances has been used to mask the taste of quinine. Among these are liquorice, yerba santa, syrup of orange, and yerbazin. The practice of using tannic acid is to be condemned, as it converts the most of the quinine into an insoluble and practically inert quinine tannate.

Quinine Bisulphate is more soluble than the sulphate and is preferred by some on that account.

Quinine Hydrochloride is less liable than the sulphate to cause head-symptoms and other unpleasant disturbances.

Quinine Salicylate is popular with some as a remedy for infective processes, as in colds, tonsillitis, rheumatism, and influenza.

Quinine Hydrobromide is less liable to produce tinnitus and is of much value in hyperthyroidea; and serves in colds, tonsillar inflammation, and la grippe.

Quinine and *Urea Hydrochloride* is a local anæsthetic, and has been successfully used for the strangulation of internal hemorrhoids. Used by injection, either subcutaneously or submucosally, it may cause irritation, is absorbed slowly, and has even been charged with causing tetanus. It has been advised in acute infectious pneumonia, and in influenzal pneumonia, in fifteen-grain doses, hypodermatically, with the hope that it might benefit, and especially to prevent cardiac and other complications. Both quinine sulphate and this salt have been useful in the elderly with sluggish intracranial circulation—those with tendency to arteriosclerosis and relaxed veins, who suffer from dizziness, mental confusion, despondency, headache and loss of memory.

RESINA.

Rosin, Colophony.

The residue left after distilling the volatile oil from the concrete oleoresin derived from *Pinus palustris*, Miller, and other species of Pinus (Nat. Ord. Pinaceæ). United States and Europe.

Description.—Amber-colored, brittle, sharp, angular, translucent fragments, usually covered with a yellow dust, and having a slight terebinthinate taste and odor. Freely soluble in alcohol, ether, benzene, glacial acetic acid and oils, both fixed and volatile; also by the dilute solutions of the hydroxides of the alkalies.

Preparations.—1. *Ceratum Resinæ*, Rosin Cerate (Basilicon Ointment). (Rosin, Yellow Wax, and Lard.)

2. *Emplastrum Resinæ*, Rosin Plaster (Rosin Adhesive Plaster). (Rosin, Lead Plaster, and Yellow Wax.)

3. *Emplastrum Elasticum*, (Rubber Plaster, Rubber Adhesive Plaster). Rubber, resins, and waxes with a farinaceous absorbent filler, mixed and spread upon cloth or other fabric.

Therapy.—*External.* Rosin is used chiefly in ointment or plaster, and seldom internally. Rosin cerate is a useful application in sluggish ulcers, promoting granulation and healing.

RESORCINOL.

Resorcinol, Resorcinum, Resorcin, Metadioxybenzol, Metadihydroxybenzene (Formula: $C_6H_4(OH)_2$).

A dictomic phenol obtained by the interaction of fused sodium hydroxide and sodium metabenzenedisulphonate.

Description.—Colorless or almost colorless needle crystals, or a powder having a feeble, peculiar odor and a sweetish, afterward bitter taste. Exposed to light and air it becomes pinkish. Soluble in less than its own weight of water or alcohol, freely soluble in ether or glycerin; but slightly soluble in chloroform. *Dose*, 1 to 5 grains, well diluted.

Action and Toxicology.—The effects of resorcin are somewhat similar to those of phenol (carbolic acid). It is a local irritant to the mucosa. While no lethal results in man are known to have occurred, pronounced toxic effects have been observed. Among them are the following: dizziness, deafness, muscular relaxation, profuse cold sweating, accelerated breathing and heart action, salivation, tinnitus aurium, disturbed vision, collapse, profound unconsciousness, and epileptiform convulsions. The urine becomes olive green. Deep narcosis has been caused by a dose of 120 grains. Recovery is rapid from resorcin poisoning, the effects usually passing off in a day's time. Alcohol is the antidote.

Therapy.—*External.* Resorcin, when applied in crystal form, is a painless caustic. In various solutions (1 to 10 per cent) and ointments (1 to 40 per cent) it is used for many purposes for which phenol is employed. A 1 to 2 per cent solution forms a good nasal and faucial spray frequently giving much relief in whooping cough and hay fever, and in nasal catarrh. A 3 per cent solution may be injected into the vagina for fetid leucorrhœa, and into the urethra and bladder for gonorrhœa and cystitis. The best results are obtained from the local use of resorcin in skin affections, through its power to remove scales, allay itching, and render the parts antiseptic. A glycerin solution (1 to 4) is advised to remove epidermal scales in chronic skin affections and for dandruff, while one containing resorcin (1), ether (1), castor oil (10), cologne (10), and alcohol (35), is advised by Wilcox for both dandruff and alopecia. An ointment (5 to 30 per cent), as indicated, may be successfully applied for the itching of erythematous eczema, in dry, scaly, seborrhœa capitis, seborrhœal eczema, erythema, acne, pityriasis and erysipelas. Hare advises it, combined with zinc oxide and ointment of rose, for eczemas with much induration and in psoriasis, and with castor oil, alcohol and bay rum, in seborrhœa sicca of the scalp. Resorcin is also reputed valuable in such parasitic diseases as tinea and scabies. In skin disorders, however, it should be applied preferably in chronic disorders as it is most too irritant for acute affections. Some have advised it, in powder or in saturated ethereal solution, as a weak caustic, in papilloma, chancre, and in diphtheria. Its employment in the latter, as well as its use in epithelioma, at one time advised, is now replaced by more approved methods.

Internal. Resorcin has been abandoned as an antipyretic, being too dangerous for such a use. It is employed chiefly internally as an antiseptic and antifermentative for fermentative gastric disorders, with irritation (1 to 2 grains every 6 hours), in cholera infantum (1/2 grain), and to relieve and control hemorrhage in gastric ulcer (2 to 4 grains); and occasionally in alternation with nux vomica, it is useful in so-called nervous dyspepsia—in reality the gastric irritability of neurotics. Resorcin should always be given largely diluted with water.

RHAMNUS CALIFORNICA.

The bark of *Rhamnus californica*, Eschscholtz (*Frangula californica*, Gray), (Nat. Ord. Rhamnaceæ). Sparingly in northern California and more abundant southerly in the Sierras, and easterly, especially in Mexico and Arizona.

Common Names: California Buckthorn, California Coffee Tree.

Principal Constituents.—Probably similar to those of Cascara Sagrada.

Preparations.—1. *Specific Medicine Rhamnus Californica. Dose*, 10 to 30 drops.

2. *Decoctum Rhamni Californici*, Decoction of Rhamnus Californica (℥ss to Oj). *Dose*, 3 to 6 fluidrachms every 3 or 4 hours.

Action and Therapy.—Rhamnus californica is cathartic and antirheumatic. It sometimes is indiscriminately gathered with cascara sagrada (*Rhamnus Purshiana*) and is known to coast dealers as "thin cascara bark." As a domestic medicine it has long been used in rheumatic disorders, and its introduction into Eclectic medicine for that purpose is due to Webster, who regards it as one of the best of antirheumatics. Given short of producing a laxative effect, he employs it (in the decoction, tincture, and the specific medicine) as the most positive remedy he has ever used for rheumatism and muscular pain of rheumatoid character. He also advises it in long-standing and obstinate dysmenorrhœa, not requiring surgical rectification. The remedy may be administered for months, provided it is used short of catharsis.

RHEUM.

The denuded and dried rhizome and roots of *Rheum officinale*, Baillon; *Rheum palmatum*, Linné, and var. *tanguticum*, Maximowicz, and probably other species of Chinese and Thibetan Rheum (Nat. Ord. Polygonaceæ). Western and central portions of China and in Thibet. *Dose*, 5 to 30 grains.

Common Names: Rhubarb, Rhubarb Root.

Principal Constituents.—*Chrysarobin* ($C_{35}H_{26}O_7$) (the yellow coloring glucoside, chrysophan or rhein) yielding chrysophanic acid ($C_{15}H_{10}O_4$); the anthracene cathartic body *emodin* ($C_{15}H_{10}O_5$); erythroretin, phæoretin, aporetin, and the astringing principle rheotannic acid ($C_{26}H_{26}O_{14}$); and quite a proportion of oxalate of calcium giving to rhubarb its grittiness.

Preparations.—1. *Specific Medicine Rheum. Dose*, 1/10 to 60 drops.

2. *Syrupus Rhei*, Syrup of Rhubarb. *Dose*, 1 to 4 fluidrachms.

3. *Syrupus Rhei Aromaticus*, Aromatic Syrup of Rhubarb. *Dose*, 1 to 4 fluidrachms.

4. *Syrupus Rhei et Potassæ Compositus*, Compound Syrup of Rhubarb and Potassa (Neutralizing Cordial). *Dose*, 1/2 to 4 fluidrachms.

5. *Pulvis Rhei Compositus* (Eclectic), Eclectic Compound Powder of Rhubarb. (Equal parts of powdered rhubarb, peppermint and bicarbonate of potassium). *Dose*, 1/2 to 2 drachms.

6. *Pulvis Rhei Compositus*, Compound Powder of Rhubarb (Gregory's Powder). (Rhubarb; Magnesium Oxide, and Ginger). *Dose*, 5 to 60 grains.

7. *Beach's Neutralizing Mixture, Neutralizing Cordial*, or *Physic.*—Take of rhubarb, pulverized, salæratus, pulverized, peppermint plant, pulverized, equal parts. To a large teaspoonful add half a pint of boiling water; when cool, strain, sweeten with loaf sugar, and add a tablespoonful of brandy. (The original formula from Beach's *American Practice*.) *Dose*, 1 to 4 fluidrachms.

8. *Locke's Neutralizing Cordial.* (Formula.) Take of coarsely ground rhubarb, peppermint herb, and potassium bicarbonate, of each three ounces; boiling water, four pints; diluted alcohol, one pint; essence of peppermint, one-half ounce; white sugar, two pounds. Macerate the rhubarb, peppermint, potassium bicarbonate in the boiling water for two hours (do not boil) in a warm place. Strain and while still warm add the sugar; after the sugar is dissolved and the liquid is cold, add the diluted alcohol and the essence of peppermint (Locke). *Dose*, 1 to 4 fluidrachms. (We have found that by adding the potassium salt to the strained infusion of the rhubarb and peppermint a clearer preparation is obtained.)

9. *Glyconda.*—A sugarless preparation of Neutralizing Cordial, in which glycerin is the sweetening and preservative agent. *Dose*, 1 to 4 fluidrachms.

Specific Indications.—Gastric irritation, with elongated, reddened tongue, and nausea and vomiting; irritative diarrhœa, with tenderness of abdomen on pressure; light-colored fecal discharges; gastro-intestinal irritation, with marked nervousness and restlessness, and screaming and convulsive muscular contractions. Sour-smelling discharges are relieved by small doses of neutralizing cordial or glyconda, while larger doses of either, or of specific medicine rheum or powdered rhubarb, are indicated for the relief of constipation with a sense of intestinal constriction and muscular contraction.

Action.—Rhubarb is stimulant to the gastro-intestinal tract, in sufficient doses increasing muscular contraction, and thus, rather than by increase of secretion, causing a cathartic action. This is probably due chiefly to the anthracene body, emodin. It affects the whole intestinal tract, especially the duodenum, and acts most certainly in the presence of bile, the secretion of which it probably promotes. The latter property, however, is still a point in dispute. Rhubarb usually purges in from four to eight hours and the stools are papescent and not watery, and of a yellowish-brown color (due to chrysophan). Their passage is attended with mild griping. The rapid absorption of the coloring matter imparts to the urine a yellow (if acid) or a carmine (if alkaline) color; the serum of the blood and mother's milk are stained yellow, and the sweat has a tawny hue. The cathartic effect of rhubarb is succeeded by a mild astringency due to the rheo-tannic acid, thus making the drug a calmative after a preliminary stimulating catharsis.

Therapy.—Rhubarb is an ideal laxative and cathartic according to the dose administered. In smaller amounts it is a gastro-intestinal stimulant and tonic, promoting the gastric secretions and insuring good digestion. As a laxative it is one of the best that can be used for children and women—especially the pregnant woman. As the evacuations produced by rhubarb are neither watery nor debilitating, when a tonic laxative is required for the feeble and for old people, rhubarb cannot be improved upon.

In severe febrile or inflammatory affections of the alimentary canal it is usually contraindicated, but where there are enfeebled digestion and irritation, or where food causes distress and irregular bowel action, either diarrhœal or constipating, its use is attended with excellent results. Aromatics mitigate its griping tendency. In lienteric diarrhœa, and where fecal accumulations are to be removed, and as a laxative following parturition, rhubarb is perfectly safe and effective.

In the summer diarrhœas of children, when necessary to clear the intestinal canal of slimy, acid, or other irritating material, whether there is diarrhœa or not, and there is both stomachic and intestinal indigestion, laxative doses of syrup of rhubarb, or the aromatic syrup or, perferable to either, the neutralizing cordial, have a most happy effect, and where other laxatives might leave an irritable condition and prolonged diarrhœa, rhubarb, through its mild after-astringency, calms the excited intestinal tract. Sometimes castor oil, which also cleanses and afterwards checks the bowels, may be given with these preparations if so desired. For the constipation of dyspeptics, with hepatic torpor, it may be given with podophyllin or aloes; and in ordinary constipation it is sometimes effective if admin-

istered in pill with soap, which, in a measure, prevents its after-constringing effect. Ten-drop doses of specific medicine rheum in a glass of cold water, taken before breakfast, may be effective in overcoming constipation. Locke advises the following during convalescence from delirium tremens: ℞ Rhubarb, Leptandra, Gentian, aa, ℥j; Ginger, ℥ij; Diluted Alcohol, Oj. Macerate. Sig.: *Dose*, One teaspoonful as required. Rhubarb is not a suitable agent where depletion is desired.

Rhubarb is an ideal summer gastro-intestinal remedy when not used as a laxative. It frequently is demanded in the practice of the specific medicationist to restrain bowel activity when the drug is administered in small doses. It thus controls diarrhœal discharges due to gastro-intestinal irritation. When the tongue is red, long, narrow, and pointed, and the tip and edges reddened and the organ shows in its every fiber the signs of irritation—whether it be during summer complaint or in the papescent diarrhœa of indigestion—it is a remedy of first importance. Here the dose should not exceed two grains of powdered rhubarb or two drops of specific medicine rheum every one-half or one hour until the character of the stools changes. An excellent medium for such conditions is the neutralizing cordial or, when sugar is contraindicated, glyconda may be substituted.

Neutralizing Cordial.—Neutralizing Cordial is one of the very best correctives yet devised for disorders of stomach and bowels, caused by overfeeding or change of water. It has three especial qualities: Rhubarb, through its specific adaptability to irritation of mucous surfaces, makes the cordial the ideal gastric sedative, for in such cases there is marked irritation, as shown by the reddened and pointed tongue. With most of these cases there is a fermentative state, with sourish and burning eructations, and often the bowel discharges contain sour and fermented material. For this condition there is no more pleasing antacid and corrective than potassium bicarbonate, though should the tongue show more pallor than redness, sodium bicarbonate may answer a better purpose. The aromatic qualities of the cordial derived from the peppermint oil and herb make it grateful as a carminative, and render it especially pleasant for children. Full doses (4 fluidrachms) act as a laxative, smaller doses as a corrective of irritation and acidity.

The physician who has not an intimate acquaintance with Neutralizing Cordial, or the Compound Syrup of Rhubarb and Potassa, has failed to realize the richness and fullness of the therapeutic allies handed down by the fathers of our school. This preparation has been prepared under various formulas, but as we have stated many times, we prefer that based upon Beach's original formula. That which we employ with greatest confidence is Locke's formula, which contains rhubarb, potassium bicarbonate, peppermint herb, peppermint essence, alcohol, and sugar. However, all of the preparations known as neutralizing cordial are of high order and possess similar properties. In sufficient dose, usually a tablespoonful, all of them are efficient agents to clear the intestines of undigested and irritating material. In Eclectic practice they have largely supplanted the use of such agents as castor oil. They are useful to cleanse the intestinal tract in indigestion, both gastric and intestinal—and in fermentative and irritative conditions of the stomach and bowels. The remedy should be given freely until the color of the stools shows the characteristic color of the medicine.

Then to tone the bowels and allay irritation it may be continued in smaller doses at less frequent intervals. On the other hand, if the cathartic effects are not desired no remedy will be oftener indicated to control irritative diarrhœa. Here the dose should not be larger than one drachm. Neutralizing Cordial finds a useful field in diarrhœa of undigested aliment, in watery, copious diarrhœa, in muco-enteritis, and in dysentery. Many physicians employ it as a vehicle for the administration of indicated remedies in stomach and bowel disorders. It is an ideal tonic to the stomach in the disorders of childhood, creates an appetite, and gives relief from pain and flatulence. The headache of indigestion, with sourish eructations, so common to children, is often cut short, as if by magic, by a laxative dose of Neutralizing Cordial. It is the most efficient remedy we have ever employed for diarrhœa induced by change of drinking water and diet when travelling. Neutralizing Cordial is one of the best of the compounds handed down to us from early Eclectic pharmacy.

The representative sugarless substitute for neutralizing cordial is Glyconda, which many employ, not alone for the purposes named above, but as a vehicle for compatible medicines. For those who object to the presence of sugar in medicines, and particularly for those who are diabetically inclined, a glycerin preserved preparation has advantages. Where the tendency, even in the presence of the bicarbonate, is toward fermentation of the gastric contents, the glycerin preparation is sometimes to be preferred.

RHUS.

The fresh leaves of *Rhus radicans*, Linné (*Rhus Toxicodendron*, Linné) (Nat. Ord. Anacardiaceæ). A common indigenous plant in fields, woods, and fence rows.

Common Names: Poison Ivy, Poison Vine, Poison Oak.

Principal Constituents.—A volatile *toxicodendric acid*, and the poisonous *toxicodendrol*, a non-volatile oil soluble in alcohol, and forming an insoluble lead compound with lead acetate, hence the use of an alcoholic solution of the lead salt to remove it and prevent poisoning or its extension. It is allied to cardol found in cashew-nut.

Preparation.—*Specific Medicine Rhus. Dose*, 1/20 to 5 drops.

Specific Indications.—The chief and most direct indication is the long-pointed tongue with prominent papillæ, associated with burning heat, and redness and great unrest. Others are: The moderately quick, small, sharp pulse, sometimes wiry, sometimes vibratile; great restlessness with or without vomiting; child starts from sleep with a shrill cry as if from fright; tongue red and irritable, exhibiting red spots; strawberry tongue; pain over left orbit; burning pain; rheumatic pain aggravated by warmth; pinched countenance; burning pain in the urethra with dribbling of urine; acrid discharges from the bladder or bowels; tympanites; brown sordes; bright, superficial redness of the skin with burning, itching, or tingling; red glistening erysipelas, with burning pain; redness of mucous surfaces; conjunctival inflammation with pain, photophobia, and burning lachrimation; inflammation with bright-red tumid surfaces and deep-seated burning pain; tumid red swellings; inflammation with ichorous discharges, the tissues seemingly melting away; old ulcers with shining red edges; induration of the submaxillary glands.

Action and Toxicology.—Internally, administered in small doses, Rhus Toxicodendron is slightly stimulant, increasing the renal and cutane-

ous secretions, and proving feebly laxative. Employed in paralytic states it is reputed to have effected a return of sensation and power of movement, the good effects being ushered in with a sensation of pricking and burning, with twitchings of the affected parts. Large doses occasion stupefaction, or a sort of intoxication, exhibited by vertigo, impairment of the special senses, pupillary dilatation, chilliness, sickness at the stomach with thirst and burning pain, and a feeling of constriction in the temporal regions. The pulse becomes slow, irregular and small, the activity of the skin and kidneys increases, weakness, trembling, and fainting occur, and sometimes convulsions ensue. A pint of rhus berries induced drowsiness, stupor, delirium, and convulsions in two children who partook of them. The infusion of the root taken internally is asserted to have produced the characteristic local eruptions, besides producing a harsh cough, scanty urine, and severe gastro-intestinal symptoms.

Locally, rhus is a powerful irritant poison. The toxic manifestations produced by the different species are of precisely the same nature, differing only in degree of intensity. Rhus Toxicodendron ranks next to poison dogwood (*Rhus venenata*) in point of virulence. While locally poisonous to some persons, others are totally unaffected by it. Many are but mildly poisoned by it; many more, however, show serious evidence of its great activity. Contact is not always necessary to obtain its effects. Indeed, many individuals apparently are poisoned merely by exposure to an atmosphere contaminated with the toxic exhalations of the plant. This is especially true when the air is heavy and humid, or when the susceptible individual is freely perspiring. Alcoholic solution of the toxic principle retains its virulence for many years (Johnson). The dried leaves are, as a rule, inert.

A singular feature connected with rhus poisoning is its recurrence from month to month, and from year to year, even when the affected individual is far remote from all exhalations of the plant. This was early noted by Barton, who personally experienced such recurrence for five successive years—a portion of which time was passed in Europe far from proximity to the plant in question. We have also observed this phenomenon. The smoke from burning rhus wood was noticed as early as 1720 by Sherard, Wangenheim, and Kalm, to produce poisonous effects. It appears that horses eat the plant with impunity (Barton). According to William Bartram, they are very fond of the leaves. Cows are wholly unaffected by the ingestion of the plant. Thunberg observed that sheep ate of the leaves of Rhus lucidum, a similar species, without harm. To dogs and guinea pigs, on the other hand, poison vine is fatal. The statement that the infusion of the leaves was administered to consumptives with non-poisonous results may seem contradictory, but we cannot but believe that a portion of the poisonous principle is volatile, in spite of the assertion that non-volatile toxicodendrol is the toxic agent, and consequently driven off in heating.

The nature of poisoning by rhus has always partaken somewhat of the mysterious, and it has been the subject of much speculation. Various reasons have been assigned as to why it poisons at all, and as to why it affects only certain individuals. It has been customary to attribute the deleterious effects to emanations from the living plant. Later, Prof. Maisch

announced a volatile substance of acid character as the offender, and named it toxicodendric acid. Still later, a bacterium was charged with creating the mischief. The latter cause, however, has now been satisfactorily disproved. An oil has now been isolated, and this, even when purified, excites exactly the same form of dermatitis as the growing plant. This discovery was made in 1895 by Dr. Franz Pfaff, of Harvard University. It is present in every part of the ivy plant, and even the dried wood is said to retain it. It has been named toxicodendrol, and is asserted to be in reality the only tangible substance found thus far to which may be attributed the toxic effects of the vine. Still, this does not explain why individuals are poisoned when not in contact with the plants. Alcohol freely dissolves this oil, but water, as with oily bodies, does not, nor does it wholly remove it from the skin; hence the reason why washing after contact with ivy does not prevent the appearance of the characteristic eruption. Experimentation (see V. K. Chestnut, *United States Yearbook of Department of Agriculture*, 1896, p. 141) has shown that if the oil be placed upon the skin, and immediately removed with alcohol, but slight effects are observed. The longer the interval, however, the more pronounced the effects become. In all, the effects were less marked than when no such treatment was given. From the fact that several portions of the skin could be impressed without coalescence of the areas, it has been concluded that the action of the oil is wholly local, and that the poison does not enter the blood. We are not, however, satisfied with this view of the matter, for if so, how are we to explain the recurrence of the trouble after weeks and months, and even years, in persons who for some time have not been near the plants or in the neighborhood of their growth?

The local effects of rhus are well known. Briefly stated, it occasions an eczematous, sometimes erysipelatoid, inflammatory eruption, characterized by intense itching, redness, and tumefaction, followed by burning pain, sympathetic febrile excitement, and vesication. The vesicles are at first small, closely aggregated in characteristic patches, and filled with a watery fluid; sometimes they become yellow, as if pus were present. Finally, as they mature, they rupture, when a yellow scab forms. The tongue is coated white, and headache and delirium are often symptoms. The effects are observable a short time after exposure to the poison, the affection usually spending its force in the course of four to five days, and is followed by desquamation of the cuticle. The face and genitalia seem to be favorite localities for the most pronounced swelling to appear. One case of poisoning by Rhus venenata came under our observation, in which the swelling of the face was so great as to wholly obliterate the features, giving to the individual a swine-like, rather than human, appearance.

Treatment.—Domestic medication, in the shape of bruised Impatiens pallida and fulva (Jewel weeds) gave prompt relief. Lack of space forbids more than the partial enumeration of the many remedies that have been extolled for the cure of this malady. The chief, however, are lobelia (infusion), veratrum, gelsemium, hamamelis, grindelia, stramonium, eupatorium, serpentaria, lindera, sassafras bark, dulcamara, oak bark, tannic acid, alnus (boiled in buttermilk), carbolized olive oil, sodium bicarbonate, borax, alum curd (especially to be used near the eyes), and, perhaps the

best of all, solution of ferrous sulphate (green vitriol). Sugar of lead (lead acetate) has long been a favorite agent for the relief of this trouble, but as it has most frequently been applied with water, it has very often failed to give relief. It has now been shown that a solution in weak alcohol (50 to 75 per cent) often gives immediate and permanent relief. Occasionally, zinc and copper sulphates, oxalic acid, potassium chlorate, and other salts are effectual. Sodium carbonate, sodium sulphate, chlorinated lime, weak ammonia solution, and lime-water have been similarly employed. Echafolta has recently been extolled in this affection.

In our opinion, the following are among the best:

Aqueous solution of sodium salicylate and colorless hydrastis, freely applied. Aqueous solution of specific medicine lobelia, to which is added a little glycerin. An alcoholic solution of lead acetate sometimes relieves promptly. An aqueous solution of ferrous sulphate is excellent. It has the disadvantage of staining. A weak aqueous solution of potassium permanganate often relieves remarkably, but it, too, stains the skin and linen.

If obtainable, fresh alder bark (Alnus serrulata) in decoction gives quick relief in many cases.

Another effective application is the so-called "Eclectic Wash" composed of lobelia, baptisia and zinc sulphate, a preparation which is now marketed under the name "Citcelce".

In every instance, if much skin is involved, the diet should be light and cooling, and the bowels should be kept well opened to relieve the kidneys of some of the extra work put upon them through insufficient cutaneous action. In fact all treatment should be accompanied by a light, cooling diet, and cooling laxatives or diuretics.

Therapy.—Rhus is a medicine for nervous irritation, nervous tension, and the typhoid state. Its range of application is wide but distinct. Acting primarily and most pronouncedly upon the nervous system, it proves secondarily an ideal sedative to control excited circulation. The action of rhus is best understood, as with other well-worked-out specific medicines —by its fitness for conditions rather than for disease-condition groups which we know as particular diseases. It is especially of great value in children's diseases, and as far as our observations go is less required in patients past fifty years of age, except as a stimulant after paralytic attacks. Its value in irritative conditions of the brain and sympathetic nervous system, as well as in disorders of the gastro-intestinal tract, is very apparent, especially in the summer bowels affections of the young. It is a remedy best adapted for infants, young children, adolescents, and for those in the prime of manhood and womanhood.

The patient requiring rhus has a small, moderately quick and vibratile pulse, especially showing sharpness of stroke and associated with burning sensations. There is always a peculiar state of erethism which indicates it. The tongue is long and narrow, with marked redness, or reddened edges and tip, and prominent papillæ, clearly disclosing a state of decided irritation and involvement of the brain centers. There may be only gastric irritability, there may be headache, there may be a jerky condition bordering closely upon a convulsive state, there may be delirium. The most noticeable symptom, however, is the great nervous unrest displayed, the

little patient being excessively nervous and explosive. In this respect it somewhat resembles the great unrest which gelsemium relieves, but the latter is usually accompanied by bright eyes and contracted pupils and high temperature. The gelsemium patient is hot and agitated and the mental excitement is great. With rhus the nervousness takes on the form of twitching, jerking, and seems motor rather than mental alone. The rhus patient sleeps fretfully and disturbedly, frequently starting suddenly from out its slumbers, and uttering a sharp, shrill cry, as if in fright—the brain cry (*cry encephalique*) -which, once heard, will never be forgotten. For the condition which this cry announces no agent is equal to rhus. Brain cry is often heard in grave disorders, as typhoid fever and meningitis. The rhus patient may have some elevation of temperature, or have normal or subnormal heat. He is jerky, apprehensive, but when very ill, apathetic. His secretions, unless it be a diarrhœa, are in abeyance. His mouth is dry and the tongue is long, narrow, red at tip and edges, and inclined to dryness. In grave disorders indicating a dissolution of the blood there is a marked glutinous character to the secretions of the mouth, or they may be nearly absent and replaced by dry, black and fetid sordes. In this will be recognized the "typhoid state".

The circulatory disturbance requiring rhus upon which the nervous phenomena chiefly depend is usually localized and not general; small areas of the brain or nerve centers only may have a disturbance of the blood supply. As a rule the marked restlessness is all out of proportion to the apparent circulatory derangement. Frontal pain, sharp in character, is a prominent indication for this drug. The rhus tongue is reddened on the tip and edges, and even may take on the strawberry character, typical of gastric irritability, typhoid, and scarlatinal states. Associate this with the kind of pulse mentioned, and with tympanites, brown sordes, and reddened mucous surfaces, and the indication is still more direct. Discharges of an acrid character, and ichorous flow from tissues which seem to disappear by mere drainage, are further guides to its use. It is a certain remedy for vomiting when the tongue is of the kind above referred to. In fact, great unrest with vomiting is one of the most direct indications for its selection.

Rhus is of value in gushing diarrhœa, with or without vomiting. It has served well in cholera infantum with copious gushing, watery stools, both to control the discharges and to relieve irritability. In muco-enteritis it may be used to alleviate nervous disquietude, and to some extent to restrain the evacuations. During dentition it is extremely useful when the nerve stress borders upon the convulsive, but for the fretful and peevish and worn-out, teething patient matricaria is the better drug.

Rhus is a drug of the very greatest value in typhoid fever. We have successfully carried many cases of enteric fever through with no other medicine than rhus—the indications being the dry tongue, low muttering delirium, sordes on the lips and teeth, and diarrhœa. Should the urine become suppressed its use should be stopped until renal activity is improved. In typhoid dysentery, fortunately now rare, it is often serviceable when associated with the head symptoms indicating rhus. Nor should rhus be overlooked in the treatment of remittent and intermittent types of fever showing a typhoid element.

Rhus is frequently a remedy for pain. The more burning in character the better it relieves. Thus it relieves deep and superficial neuralgic and neuritic pains, the pain of pleurisy, and that of cystitis. Rhus is an aid, seldom a master, in acute rheumatism, but it helps to control pain when of a burning character, and the surfaces present an erysipelatoid redness. There is swelling, tension, and a glistening skin. When rheumatism is aggravated by the warmth of the bed, rhus appears to be indicated. Acute cases are more benefited than so-called chronic rheumatism, though it is especially useful in both to control restlessness. In toothache not due to caries, occurring in a rheumatic subject, rhus often relieves. These cases are said to be aggravated by warmth or by warm liquids. There are two forms of rheumatism especially benefited by rhus, whether they are acute or chronic. One is that induced by dampness and having pain of a subacute type; the other, so-called rheumatic involvent of the fibrous tissues of the body—the tendons, fasciæ, ligaments, and muscle sheaths. The latter cases are probably not rheumatic, but due to toxic impression through retained poisons which impress the nervous system and produce pain. Only indifferent results attend its use in lumbago—though it should be tried when general rhus indications are present. Administered for a long period in small doses, rhus is one of the most satisfactory drugs for the articular stiffness resulting from rheumatic inflammation.

Rhus is frequently administered to relieve headache. That occurring in the frontal region is most amenable. Many contend that left-sided headache is that in which it is indicated, but we have never been able to verify this contention. With the rhus tongue and sharp stroke of the pulse and nervous tension present, we have found it to act equally well on either side of the head, or for that matter, upon any part of the body. The same may be said in neuralgia, whether in sciatic, facial, intercostal, or other forms. When it does relieve headache and neuralgia it usually acts promptly.

Rhus is a valuable aid in pneumonia, bronchitis, la grippe, and phthisis, when the patient is extremely irritable and suffers from gastric irritation. With the small wiry pulse as a guide it often controls restlessness and delirium in these disorders and in adynamic fevers, which are probably caused by irritation and local hyper-vascularization of limited areas in the cerebral and other nerve centers. It is indicated in typhoid pneumonia, with red, glazed tongue, and offensive muco-purulent expectoration. Uncontrollable, dry, spasmodic, and tickling cough is frequently relieved by it.

In the exanthemata rhus appears to exert a special antagonizing influence, for which it may be given in scarlatina and measles where the vital powers are greatly depressed, and in variola, with livid color of the surface and foul discharges.

Rhus has been employed successfully in paraplegia without marked organic lesion, and in paralysis of the bladder and of the rectum. In paralytic states, however, it is usually of little value except in those conditions which follow attacks of rheumatism. We have, however, found it of great value in restoring power after hemiplegia and paraplegia. It should be given in liberal doses for a continued length of time. Its efficiency in sciatica, however, is admitted by some who think the drug practically valueless as a medicine.

Rhus is a remedy in the various disorders of the skin presenting the characteristic rhus indications—redness, intumescence, and burning. For vivid, bright-red, glistening erysipelas, especially when confined to the upper part of the face, with marked puffiness, it is one of the most successful of remedies. In fact in acute inflammations of the skin it is often more serviceable than aconite and veratrum. It is of great value in herpes where there are burning, itching, and exudation of serum. Eczema, pemphigus, and many irritable and inflammatory skin affections are relieved by it when redness, intumescence, and burning are prominent symptoms. It frequently proves the indicated drug in urticaria and functional pruritus. Erythematous and erysipelatous inflammation of the vulva, with burning pain, and the itching and vulval irritation following micturition, are often permanently relieved by rhus. Tumid, reddened, and glistening enlargements, and ulcerations with red glistening margins, syphilitic or non-syphilitic, likewise call for rhus. In the ulcerative forms the parts seem to melt away without sloughing. It is of much value in parotitis, and in swelling of the submaxillary gland with great induration few remedies are better (Locke). Its constitutional effects are often manifested in slow-forming carbuncle and carbunculous furuncles. By some rhus has been used internally to hasten the cure of cutaneous rhus poisoning. Of this antitoxic power over poisoning by itself we have never been satisfactorily convinced.

In ocular therapeutics rhus is considered by many Eclectic oculists as an important drug. It is sometimes administered to prevent inflammatory action after cataract operations. Palpebral œdema with marked redness is said to be relieved by it, while neuralgic and other pains in the globe of the eye, and aggravated by motion and warmth, often vanish under its use. Acute and subacute forms of conjunctivitis are relieved by it on account of its special affinity for the blood vessels of the orbit. In the catarrhal ophthalmia of scrofulous children with strongly inflamed palpebral edges and conjunctivæ and marked photophobia and burning lachrimation, the action of the remedy is decided and prompt. There is usually a sensation as of foreign particles, such as sand, etc., in the eye.

The proper dose for specific effects, and it is scarcely employed in any other manner, is the fraction of a drop of specific medicine rhus, thus; ℞ Specific Medicine Rhus, gtt. v to xv; Water, fl℥iv. Mix. *Dose*, One teaspoonful every hour in acute disorders; four times a day in chronic affections. Rhus should, as a rule, be given unmixed with any ingredient but water.

RHUS AROMATICA.

The bark of the root of *Rhus aromatica*, Aiton (Nat. Ord. Anacardiaceæ). A small shrub of the rocky regions of eastern United States. *Dose*, 5 to 60 grains.

Common Names: Fragrant Sumach, Sweet Sumach.

Principal Constituents.—Volatile and fixed oils, tannin, and several resins.

Preparation.—*Specific Medicine Fragrant Sumach. Dose*, 5 to 60 drops.

Specific Indications.—"Stools profuse, skin cool and sallow, pulse small and feeble, loss of flesh, abdomen flabby, tongue pale, trembling and moist, trembling in lower limbs; general sense of lassitude and languor" (McClanahan). Painless diarrhœa; nocturnal enuresis, from weakness of sphincter vesicæ; and malarial hematuria.

Action and Therapy.—Rhus aromatica is a remedy for excessive discharges of urine and painless but profuse forms of diarrhœa. It is also serviceable in some forms of passive hemorrhage, particularly malarial hematuria, a disorder quite prevalent in the Southern States. Occasionally it will serve a useful purpose in purpura hemorrhagica and in very mild cases of hemoptysis of phthisis, but is a better agent for the diarrhœa and night sweats of that disease.

The principal use of fragrant sumach is to control bedwetting in children with weak bladder. In some instances its action is more satisfactory than that of any other drug; in others it fails. When irritability of the urinary passages is due to sphincteric weakness it is usually successful; when due to colds, worms, and various other extraneous causes it is likely to prove ineffectual. Polyuria is one of the conditions markedly improved by this drug, and some have thought it to have a restraining effect both upon the hypersecretion of urine and the output of sugar in diabetes. Apparently it is only in exceptional cases that it displays this power, and too much reliance should not be placed upon it in severe cases. As an aid to control some of the phases of diabetes, as excessive urination, it should be used in conjunction with other approved methods. While chiefly of value in the enuresis of children, it sometimes proves of service in that of the elderly, and especially when there is much irritation, occasional passages of bloody urine, and evident relaxed habit of the urinary tract. It is sometimes useful in chronic, painful, vesical catarrh. It is also useful in chronic bronchitis with profuse blood-streaked expectoration.

Fragrant sumach often restrains diarrhœa of the free and painless type, notably in cholera infantum. In all disorders fragrant sumach should not be used where there is inflammation. The drug is best dispensed in glycerin as follows: ℞ Specific Medicine Fragrant Sumach, fl℥ss; Glycerin, fl℥iij ss. Mix. Sig.: From one-half to one teaspoonful, in water, every three or four hours.

RHUS GLABRA.

The fruit, leaves and root bark of *Rhus glabra*, Linné (Nat. Ord. Anacardiaceæ). Common in thickets in the United States and Canada. *Dose*, 1 to 30 grains (bark).

Common Names: Smooth Sumach, Upland Sumach, Pennsylvania Sumach.

Principal Constituents.—A large amount of tannin abounds in the bark and leaves; resin (bark); tannic and gallic acids, malic acid and malates, volatile oil, and red-coloring matter (fruit).

Preparation.—*Fluidextractum Rhois Glabræ*, Fluidextract of Rhus Glabra. *Dose*, 5 to 60 drops.

Specific Indications.—Relaxed mucosa, with unhealthy discharges; mercurial ulcerations; aphthous stomatitis; spongy gums; flabbiness and ulceration of tissues; ulcerative sore throat with fetid secretion.

Action and Therapy.—*External.* All parts of the smooth sumach are astringent and antiseptic and of much value in flabbiness of tissue, with tendency to ulceration and unhealthy secretion. An infusion of the fruit provides an excellent gargle for fetid sore throat and a wash for aphthous ulcerations. It is a useful drug in decoction of the bark, infusion of the berries, or in fluidextract wherever a mild and deodorant astringent is required; especially is it serviceable in the spongy bleeding gums of scorbutic patients and that of hemophiliacs.

RUBUS.

The bark of the root of *Rubus villosus*, Aiton; *Rubus canadensis*, Linné; and *Rubus trivialis*, Michaux (Nat. Ord. Rosaceæ). Wild and cultivated in the United States. *Dose*, 5 to 60 grains.

Common Names: (1) Blackberry; (2) Low Blackberry; (3) Low-bush-Blackberry.

Principal Constituents.—Tannin. Fruits contain citric and malic acids; the glucoside *villosin* (in *Rubus villosus*) a body similar to saponin, and about 20 per cent of tannin.

Preparations.—1. *Specific Medicine Rubus. Dose*, 5 to 60 drops.
2. *Syrupus Rubi*, Syrup of Black Raspberry. *Dose*, 1 to 2 fluidounces.

Specific Indication.—Gastro-intestinal atony, with copious watery and pale feces.

Action and Therapy.—The decoction of rubus is a mild and agreeable astringent in watery diarrhœas, especially in children, when the stools are clay-colored or pale. There is marked enfeeblement of the stomach and bowels, and the child is fretful, has no appetite, and there is marked pallor of the skin. The syrup or a spiced cordial of the bark and another of the fruit have been used largely in domestic practice to control intractable diarrhœas. They act best after a thorough purging with castor oil or similar cathartic has been resorted to. *Rubus strigosus* (Red Raspberry) has similar uses.

RUBUS IDÆUS.

The fruit of *Rubus Idæus*, Linné (Nat. Ord. Rosaceæ). Cultivated.

Common Name: Raspberry.

Principal Constituents.—Malic and citric acids, lævulose, 4.6 per cent and dextrose (2.5).

Preparation.—*Syrupus Rubi Idæi*, Syrup of Raspberry (chiefly a vehicle).

Action and Therapy.—An infusion of the leaves is useful in the diarrhœa of relaxation, with copious watery discharges. The fruit as prepared in a syrup—Syrupus Rubi Idæi—is highly prized as a flavored vehicle for medicines and for the beautiful color it imparts to pharmaceutical mixtures. Diluted and iced it forms an agreeable acidulous drink for fever patients. A refreshing fever drink is also prepared by mixing equal parts of syrup of raspberry and vinegar and diluting with water to taste.

RUMEX.

The root of *Rumex crispus*, Linné (Nat. Ord. Polygonaceæ). A common weed introduced from Europe, and found abundantly in this country in waste places, among rubbish, and in cultivated grounds. *Dose*, 5 to 60 grains.

Common Name: Yellow Dock.

Principal Constituents.—Yellow Dock has not been satisfactorily analyzed.

Preparation.—*Specific Medicine Rumex. Dose*, 1 to 60 drops.

Specific Indications.—Vitiated blood with chronic skin disorders; low glandular and cellular deposits with tendency to indolent ulcers; feeble recuperative power; chronic sore throat, with glandular engorgement and hypersecretion; cough, with shortness of breath and præcordial fullness; dry, irritative laryngo-tracheal cough; stubborn, dry summer cough; nervous dyspepsia, with epigastric fullness and pain extending into the chest.

Action and Therapy.—Rumex is decidedly alterative and might be used more extensively for that purpose. It should especially be brought

into requisition in depraved states of the body fluids with tendency to chronic skin disorders, with glandular engorgement, tendency to ulceration, and slow recuperative powers. It is especially valuable in strumous patients with low deposits in the cellular and glandular tissues which break down easily but are very slow to repair. In small doses the specific medicine is also useful in nervous dyspepsia with epigastric fullness, and pectoral pain from gaseous distention of the stomach. It is also serviceable in laryngeal irritation, with cough of the types alluded to under Specific Indications.

RUTA.

The leaves and unripe fruit of *Ruta graveolens*, Linné (Nat. Ord. Rutaceæ). A half shrubby perennial introduced into American gardens from Europe. *Dose*, 1 to 10 grains.

Common Names: Rue, Garden Rue.

Principal Constituents.—A volatile oil (*Oleum Rutæ*), *coumarin*, the yellow glucoside *rutin* (rutic acid), and a volatile alkaloid.

Preparations.—1. *Oleum Rutæ*, Oil of Rue. *Dose*, 1 to 6 drops.

2. *Tinctura Rutæ*, Tincture of Rue (fresh herb, ℥viii; Alcohol, Oj). *Dose*, 1 to 10 drops.

Action and Therapy.—Rue is a gastro-intestinal irritant and a poison to the nervous system, capable, in large doses, of causing death. It is emmenagogue and anthelmintic. Acting strongly upon the uterus, it may be given in amenorrhœa due to atony, but the dose must be small lest an inflammatory action be induced. It is a good vermifuge, though its disagreeable taste is a decided obstacle to its use. It has been suggested as a remedy for irritability of the urinary tract when due to atony, and in nervous disorders of a spasmodic type. On account of its ecbolic qualities it should not be administered during pregnancy.

SACCHARUM.

Sugar, Sucrose. (Formula: $C_{12}H_{22}O_{11}$.)

A substance obtained from *Saccharum officinarum* (Nat. Ord. Gramineæ), the sugar-cane, and from *Beta vulgaris*, Linné, var. *Rapa*, Dumort (Nat. Ord. Chenopodiaceæ), the sugar beet, and other sources. Southern Asia and extensively cultivated in tropical and subtropical countries, notably the southern portion of the United States.

Description.—Hard white crystals, or a crystalline white powder, without odor and having a pure and pleasant sweet taste. Very soluble in cold and hot water, less soluble in alcohol (about 1 in 175 parts), and insoluble in ether or chloroform. Permanent when kept dry; ferments readily in dilute solution.

Preparation.—*Syrupus*, Syrup (Syrupus Simplex, Simple Syrup, Sirup). Sugar, 850; Distilled Water to 1,000 parts; prepared by heating and straining

Action and Therapy.—*External.* Sugar is demulcent, antiseptic, and antiputrefactive, but not antifermentative. It enters into lotions and douches for nasal and throat disorders, not alone for its agreeable sweetening quality but for its antiseptic and soothing effect. Its local use sometimes relieves cough, hoarseness and soreness of the throat. Sluggish and heavily granulating ulcers have been successfully treated with powdered sugar, and some have advised it for small wounds. It is used in the preparation of lozenges and tablets, and as a coating and ingredient of some pills.

Internal. Internally sugar is demulcent, nutritive, and antiputrefactive as well as diuretic. As an article of food it is valuable but abused, and as it does not contain nitrogen it cannot alone sustain life. Small

amounts promote digestion. Used in large quantity it is injurious to digestion, readily causing fermentation and acidity of the stomach with flatulence and eructations of gas. Sugar intolerance is produced in some individuals, and especially in infants, with resultant skin eruptions. In some adults its excessive use causes fatigue and pains simulating neuritis. It is contraindicated in obesity, diabetes mellitus, sugar intolerance, and in gastro-intestinal fermentation, with flatulence and disturbed bowel action. Its chief use is in the preparation of medicinal syrups, in which it prevents putrefactive change, and in the extemporaneous prescribing of otherwise unpleasant medicines. In this respect it is frequently abused, as it sometimes prevents the full and intended action of the medicines so incorporated.

SACCHARUM LACTIS.

Sugar of Milk, Milk Sugar, Lactin, Lactose. (Formula: $C_{12}H_{22}O_{11}$. H_2O.)

A peculiar crystalline sugar, obtained by evaporation and recrystallization, from the whey of cow's milk.

Description.—Permanent, hard, white crystalline masses, or a white powder somewhat gritty, without odor and having a feebly sweet taste; readily soluble in cold and hot water; almost insoluble in alcohol and wholly insoluble in ether or chloroform. *Dose*, 1 to 6 ounces.

Action and Therapy.—Employed chiefly for the purpose of making triturations, as of elaterin, podophyllin, santonin, sulphur, etc, and as an ingredient of Dover's and the diaphoretic powders. It has scarcely any effect upon the human body other than to induce increased diuresis, a property that some deny. It is preferable to cane sugar for sweetening infants' foods, though not wholly free from the tendency to cause fermentation in the stomach. For the latter purpose it is now largely superseded by dextri-maltoses. When stomach disorders are non-fermentative it may relieve gastric irritability; and, being non-nitrogenous, it has been employed as a food in pulmonary and other disorders where such a diet is desired, using it in the food. Germain Sée strongly advocated it in doses of one to six ounces diluted with water or milk, and in a concentrated syrup as a powerful hydragogue diuretic in dropsies of cardiac origin.

SALICINUM.

Salicin. (Formula: $C_{13}H_{18}O_7$.)

A glucoside obtained from several species of *Salix* and *Populus* (Nat. Ord. Salicaceæ). Europe; naturalized and cultivated in North America.

Description.—Very bitter, colorless, or lustrous, white silky crystals, or a white crystalline powder; without odor; soluble in water and alcohol, insoluble in ether or chloroform. *Dose*, 5 to 20 grains.

Specific Indications.—Periodicity, with rheumatic pain or that simulating rheumatism; acute rheumatism (with special sedatives to control temperature); malarial diarrhœa; dyspepsia, due to a malarial infection.

Action and Therapy.—Salicin, though not poisonous to man, has in large doses produced severe symptoms—"dusky countenance, severe headache, nervous irritability, extreme weakness, tinnitus aurium, hurried breathing, tingling of the extremities, and huskiness of the voice." It does not reduce temperature in health, but does so in fevers, especially when of malarial origin. Salicin is oxidized in the body, passing in the urine as salicylous, salicylic, and salicyluric acids.

Salicin is a good but often neglected medicine, and is of more value as an antiperiodic and tonic than as a febrifuge. It is non-irritating to the stomach and often serves as a good bitter peptic. When quinine is not well borne or is contraindicated, salicin may be substituted for it, and in some instances it is preferable to quinine in malarial intermittent fever. It may also be used in lieu of salicylic acid and the salicylates in acute articular rheumatism, association with the special sedatives to control fever enhancing its value. The dose required is quite large—five to ten grains, sometimes thirty to forty grains, every three or four hours. Owing to its decomposition products, large doses may induce results bordering upon salicylism. As the chemical change is slowly effected, however, unless too frequently repeated and in very large doses, cumulation need not be feared. When intermittents are accompanied by rheumatic pain, from ten to thirty grains may relieve the distress. Good results have attended the use of salicin in influenza when pain and periodicity were present; and in this disorder it is much to be preferred over quinine. It may also be used to relieve periodical neuralgia of malarial or miasmatic origin, and attended by a feeble circulation, cold skin, and general debility. As a tonic to the digestive organs and general system, small doses after meals are of much value and should be more generally used than cinchona and its alkaloids. It sometimes checks the diarrhœa of phthisis and tones the mucous tissues when prone to excessive discharges. Salicin should be administered in capsule after meals, and followed by a draught of water or milk.

SALIX NIGRA.

The bark and aments of *Salix nigra*, Linné (Nat. Ord. Salicaceæ); United States, particularly along streams in New York and Pennsylvania.

Common Names: Black Willow, Pussy Willow.

Principal Constituents.—The *bark* contains tannin and *salicin* (see *Salicinum*).

Preparation.—*Specific Medicine Salix Nigra Aments. Dose*, 10 to 60 drops.

Specific Indications.—Sexual erethism, irritability, and passion; libidinous thoughts; lascivious dreams; nocturnal emissions; mild nymphomania, erotomania and satyriasis; cystitis, urethral irritation, prostatitis, and ovaritis, and allied disorders following in the wake of sexual abuse or excesses.

Action and Therapy.—Salix nigra is a remedy of great value in a restricted field in therapeutics. While the bark and its preparations have long been recognized as possessing antiseptic and detergent properties, the use of the aments is of more recent date and confined almost wholly to the generative organs. To be of value, however, only the freshly gathered aments should enter into its preparations to insure medicinal results. Above all other uses, its greatest value is in that form of sexual erethism and irritability due chiefly to an irritative condition of the urethra resulting in spermatorrhœa, and less in such sexual perversions as give rise merely to physiological losses; nor can it take the place of the knife when losses are due to conditions requiring surgical correction. In well indicated cases it proves a decided and valuable anaphrodisiac and tonic. The mental emotions play a lesser part in the disorders requiring salix nigra, but when the genital tract is sensitive, when the bladder becomes

involved, and when sexual excesses and masturbation are the causal factors, it is a remedy of first importance. Secondarily, it is not without value where the mentality of the victim is at fault, but will be found to moderate passion and strengthen the reproductive tract when pollutions are the result of sexual intemperance, libidinous thoughts by day, and lascivious dreams by night.

SALVIA.

The leaves of *Salvia officinalis*, Linné (Nat. Ord. Labiateæ). A native of Europe, but cultivated extensively in kitchen gardens. *Dose*, 5 to 30 grains.

Common Names: Sage, Garden Sage.

Principal Constituents.—An aromatic, volatile oil (oil of sage), the chief principle of which is thujone (50 per cent).

Preparation.—1. *Tinctura Salviæ*, Tincture of Sage (Sage, ℥viij; Alcohol (76 per cent), Oj). *Dose*, 1 to 60 drops.

2. *Infusum Salviæ*, Infusion of Sage (℥ss to Water, Oj). *Dose*, 1 to 4 fluidounces.

Specific Indications.—Skin soft and relaxed; extremities cold and circulation feeble; urine of low specific gravity; colliquative sweating.

Action and Therapy.—Sage is a feeble tonic, astringent, and diaphoretic. The infusion provides a good gargle for ulcerated and inflamed throat and for relaxation of the uvula. Taken warm, it produces free sweating, while cold sage tea, by strengthening the cutaneous functions, restrains excessive sweating, and for this purpose is highly valued in phthisis and other wasting diseases. It acts best when the skin is soft and relaxed, the extremities cold, and the circulation weak. It is of considerable value in gastric debility with flatulence, and has proved a good tonic in spermatorrhœa. A good indication for salvia is urine of low specific gravity.

SAMBUCUS.

The flowers and the fresh inner bark of *Sambucus canadensis*, Linné (Nat. Ord. Caprifoliaceæ). An indigenous shrub growing in low, damp grounds and waste places. *Dose*, 5 to 60 grains (bark).

Common Names: Elder, American Elder.

Principal Constituents.—*Valeric acid*, tannin, volatile oil, and a resin.

Preparation.—*Specific Medicine Sambucus. Dose*, 1 to 60 drops.

Specific Indications.—In skin diseases when the tissues are full, flabby, and œdematous, the epidermis separates and discharge of serum is abundant, forming crusts; indolent ulcers, with soft œdematous edges; mucous patches with free secretions; post-scarlatinal dropsy; low deposits in or depravation of tissues.

Action and Therapy.—*External.* An ointment of sambucus has been successfully used in weeping eczema, and in old ulcers as a stimulant when the tissues are full and flabby and attended with a discharge of serum.

Internal. Sambucus is stimulant; the flowers in warm infusion are diaphoretic; the cold infusion, diuretic and alterative. Preparations of the green inner bark are excellent agents in œdematous conditions, especially in skin diseases showing a tendency to ulceration, with watery discharges and boggy edges. The epiderm separates easily and the weeping secretions form crusts. Probably its most direct indication is depravation of tissue, with œdema and deposits of cacoplastic material. Sambucus is useful in catarrhal nasal obstruction in infants and in the dropsy follow-

ing scarlet fever. It deserves further study in œdematous conditions. A strong decoction of the fresh inner bark of the root (bark ℥j, water Oij, boiled down to Oj) in doses of two to four fluidounces, will sometimes promptly empty the tissues of dropsical effusion and act slightly upon the bowels.

SANGUINARIA.

The rhizome and roots of *Sanguinaria canadensis*, Linné (Nat. Ord. Papaveraceæ), gathered in autumn after the leaves and scape have died to the ground. Found in woods and clearings and along old fences in North America from Canada to the Gulf of Mexico and from the Atlantic to the western boundary of the States bordering the west bank of the Mississippi. It is one of our most beautiful vernal flowers and is rapidly becoming scarce on account of the ravages of despoilers of our native flora. *Dose*, 1 to 5 grains (expectorant); 15 to 20 grains (emetic; not used).

Common Names: Bloodroot, Red Puccoon, Puccoon, Indian Paint, Tetterwort, etc.

Principal Constituents.—*Chelerythrine* (forming yellow salts with acids), *sanguinarina* (forming red salts with acids), *gamma-homochelidonine* and *protopine*, all of which are alkaloids; alcohol soluble resin and *sanguinarinic acid.*

Preparations.—1. *Specific Medicine Sanguinaria. Dose*, 1 to 10 drops, well diluted. (*Usual form of Administration:* ℞ Specific Medicine Sanguinaria, gtt. v to x; Water, ℥iv. Mix. Sig.: One teaspoonful every two or three hours.

2. *Tinctura Sanguinariæ Acetata Composita*, Compound Acetated Tincture of Bloodroot (Acetous Emetic Tincture). An acetated tincture of Sanguinaria, Lobelia and Dracontium. *Dose*, 20 to 60 drops (expectorant); 1 to 4 fluidrachms (emetic).

Specific Indications.—"Burning and itching mucous membranes, especially of fauces, pharynx, Eustachian tubes, and ears; less frequently of larynx, trachea, and bronchi, occasionally of stomach and rectum, and rarely of vagina and urethra; mucous membrane looks red and irritable; nervousness, redness of nose, with acrid discharge, burning, and constriction in fauces or pharynx, with irritative cough and difficult respiration" (Scudder). "Feeble circulation, with coldness of extremities" (Locke).

Action.—The physiological action of sanguinaria is pronounced. The powder, when inhaled, is exceedingly irritating to the Schneiderian membrane, provoking violent sneezing, and free and somewhat prolonged secretion of mucus. To the taste, bloodroot is harsh, bitter, acrid, and persistent, and, when swallowed, leaves an acridity and sense of constriction in the fauces and pharynx, and induces a feeling of warmth in the stomach. In small doses, it stimulates the digestive organs, and increases the action of the heart and arteries, acting as a stimulant and tonic; in larger doses it acts as a sedative to the heart, reducing the pulse, causing nausea, and, consequently, diaphoresis, increased expectoration, and gentle diuresis, at the same time stimulating the liver to increased action. If the dose be large, it provokes nausea, with violent emesis, vertigo, disordered vision, and great prostration. It also increases the broncho-pulmonary, cutaneous, and menstrual secretions. It is a systemic emetic, very depressing, causing increased salivary and hepatic secretions, and hypercatharsis may result. When an emetic dose has been taken, the heart's action is at first accelerated, and then depressed. Poisonous doses produce violent gastralgia of a burning and racking character, which extends throughout the gastro-intestinal canal. The muscles relax, the skin becomes cold and clammy, the pupils dilate, there is great thirst and anxiety, and the heart's action becomes slower and irregular. Spinal reflexes are reduced and paralysis of the spinal nerve centers follows. Lethal

doses produce death by paralysis of medullary, respiratory, and cardiac centers, death being sometimes preceded by convulsions.

Therapy.—*External.* Sanguinaria is sternutatory, but is no longer used, as formerly, in snuff to excite secretion or to reduce polypi and other nasal growths and turgescence; to alleviate headache, neuralgia, or chronic nasal catarrh. A cataplasm of slippery elm and blood root is a favorite domestic remedy for frozen feet and chilblains; and an acetated decoction has received professional endorsement for some forms of eczema, ringworm, and warts. An ointment has also been successfully used in tinea.

Internal. Sanguinaria fulfills a variety of uses according to the size of the dose administered. Minute doses relieve irritation, whereas large doses provoke such an effect. Though decidedly emetic it should never be used alone as such, but in combination, as in the acetous emetic tincture, it may, in rare cases, be used as a systemic evacuant where it is thought necessary to thoroughly cleanse the stomach, and to excite to activity sluggish hepatic and general glandular function. Such a course is one of the oft-neglected means once employed in prefebrile states, and was effectual sometimes in preventing the onset of continued and intermittent fevers. An occasional emetic of this type also acts well in chronic stomach disorders, with arrest of function and gaseous eructation, and succeeds in emptying the stomach of a great quantity of ropy mucus, thus preparing the way for the kindly reception of other needed remedies.

Sanguinaria has a gentle but reliable cholagogue action, and may be used in hepatic torpor, congestion of the liver, and subacute and chronic hepatitis. In hepatic debility, where the bile is deficient or vitiated and the general circulation feeble, with cold extremities and in sick headache, catarrhal jaundice, and duodenal catarrh depending upon a like condition, small doses of sanguinaria are efficient. Nor should it be overlooked for gastric catarrh and atonic dyspepsia associated with hepatic torpor and circulatory enfeeblement. Drop doses of the specific medicine (well diluted), every two or three hours, best meet these functional derangements. The alterative properties of sanguinaria are not to be underestimated.

Bloodroot is useful in amenorrhœa in anemic and chlorotic patients who suffer with chills and headache, and in dysmenorrhœa in debilitated subjects. When due to vicarious menstruation, hemorrhage from the lungs is said to have been controlled by it. It may be used also for sexual debility, seminal incontinence and impotence dependent upon such conditions and relaxed genital organs.

One of the most important fields for sanguinaria is in disorders of the respiratory organs. It resembles lobelia somewhat in action. It is a useful stimulating expectorant, but should be employed only after active inflammation has been subdued, and in atonic conditions. It favors normal secretory activity, restoring the bronchial secretions when scanty and restraining them when profuse. It is specifically indicated when chilliness is a dominant feature of respiratory disorders, and is further indicated by burning and itching of the naso-laryngeal tract, tickling or burning in the nasal passages, with super-abundant secretion, irritation and tickling provoking cough; and when secretions are checked it relieves dry cough by promoting normal moisture. Keeping the specific guides in mind it will be

found exceedingly effective in acute and chronic bronchitis, laryngitis, sluggish types of pharyngitis and faucitis, with deep red and irritable dry membranes, and in acute and chronic nasal catarrh. Too much must not be hoped for from its use alone in the latter, for catarrh of the nose and throat is not readily amenable to medication, unless the patient has the courage to persist in treatment in the face of many conditions disturbing to the nasal tract. In all such cases the general systemic treatment is a most important desideratum, and it is almost certain that without such care local treatment seldom effects a cure. Bloodroot, in decoction, has served well in the sluggish form of scarlatinal angina with tendency to destruction of tissue. It has been advised in whooping cough, but is too harsh in the doses required to use upon young children, and in mucous croup the same objection holds good. Its use as an emetic, once popular, in pseudo-membranous croup is also inadvisable, such a condition now being recognized as almost always a laryngeal diphtheria, and it should, therefore, be treated by the more approved antidiphtheritic measures. After pneumonia, when debility persists and cough and viscid secretion continue and it is difficult to expectorate, specific medicine sanguinaria, with or without lycopus, wild cherry, or eucalyptus, in syrup, is one of the most efficient of medicines. The dose should be regulated so that the patient receives about one or two drops of the sanguinaria every two to four hours. It similarly benefits phthisical cough with difficult expectoration, but should be withheld if it provokes gastric irritation or nausea. It has no effect whatever upon the tubercular state. (See also *Sanguinarinæ Nitras*, *Acetous Emetic Tincture*, and *Compound Emetic Powder*.)

SANGUINARINÆ NITRAS.

Sanguinarine Nitrate.
A salt of the mixed alkaloids of Sanguinaria.

Description.—A crimson or brick-colored powder, according to method of preparation, having an acrid taste and slight blood-root odor, and intensely irritating to the mucous membrane. It dissolves freely in water. *Dose*, 1/30 to 1/4 grain.

Preparations.—1. *Trituratio Sanguinarinæ Nitras*, Trituration of Sanguinarine Nitrate (1 to 100). *Dose*, 1 to 10 grains.

2. *Syrupus Sanguinarinæ Nitras*, Syrup of Sanguinarine Nitrate. Extemporaneously prepared by adding from 1/2 to 2 grains of the salt to four fluidounces of syrup and water. *Dose*, 1 fluidrachm.

Specific Indications.—The specific indications are: "Tickling or irritation of the throat, with cough, burning, or irritative sensation in the breathing passages, with red surface and thin acrid burning or smarting discharges; dryness of the throat and naso-pharynx, with sharp lancinating pain, and a feeling as if the walls of the throat were rubbing each other; post-sternal constriction, or sense of uneasiness at the suprasternal notch, with difficulty of breathing, sense of uneasiness and burning in the stomach.

Action and Therapy.—The action of this salt is similar to that of Sanguinaria, which see. For respiratory uses it is preferred by some to the parent drug, the syrup being the preferred form of administration. It is especially effective in explosive cough due to irritation at the bifurcation of the bronchi, and greatly aggravated by assuming the recumbent position.

SANTONINUM.

Santonin. (Formula: $C_{15}H_{18}O_3$.)

An anhydride or lactone of santonic acid derived from *Artemisia pauciflora* (Ledebour), Weber (Nat. Ord. Compositæ), the Santonica or Levant Wormseed. Europe and Asia.

Description.—Colorless, lustrous, flattened, prismatic crystals or crystalline powder, without odor, and at first without taste but subsequently becoming bitter. Air does not affect it, but upon exposure to light it turns yellow (photosantonic acid). Very soluble in chloroform, less so in alcohol and ether; very slightly soluble in cold and boiling water. *Dose*, 1/10 to 4 grains (adult); 1/20 to 2 grains (child).

Specific Indications.—Worms (except tapeworm and hookworm); picking or rubbing at the nose; gritting of the teeth, starting or groaning in sleep, tumid abdomen, fetid breath, anorexia and nausea, with slimy stools and malnutrition; retention of urine from atony; nocturnal enuresis from atony; anuria of fevers; anuria from opium; anuria of the newborn; vesical tenesmus and strangury; deficient spinal innervation, with impaired respiration.

Action and Toxicology.—Santonin in overdoses acts upon the cerebral cortex and stains the tissues yellow. All the tissues and fluids of the body capable of showing it reveal this peculiar coloration. Even in ordinary doses the urine is stained so that when it drops upon the clothing it leaves its mark. Large doses, and especially poisonous ones, cause the urine to assume progressively a color ranging from yellow to saffron, and if the urine be alkaline, reddish-purplish. This effect is of constant occurrence in poisoning, as is also a peculiar effect upon the vision in which objects are seen yellow, or green, or blue, or red. This peculiar phenomenon, once thought to be due to the action of air upon the santonin (Giovanni), is now known to be due to the staining of the alkaline serum of the humors of the eye, and its perceptivity by the sight centers of the brain. It is termed chromatopsia or xanthopsia. Poisonous doses of santonin cause gastric pain, dizziness, pallor, and coldness, with profuse sweating, followed by heat and congestion of the vessels of the head; muscular trembling, dilated pupils, twitching of the eyes and head, epileptiform convulsions, tetanic cramps, unconsciousness, and death by paralysis of the respiratory centers. In doses insufficient to produce convulsions or death aphasia sometimes occurs, and temporary, and rarely, total blindness may result. Sometimes symptoms resembling cholera morbus are caused by santonin, but it is said never to induce gastro-enteritis. Even medicinal doses sometimes produce anuria.

The treatment of poisoning consists in evacuation of the bowels by a brisk purge, artificial respiration, inhalation of chloroform or ether to check convulsions, and the use of ammonia, and the hypodermatic use of strychnine.

Therapy.—Santonin is the best and most commonly used vermifuge for the expulsion of the round worm or *ascaris lumbricoides*. It has little effect upon the rectal ascaris (seat or thread worm), and none whatever on the tapeworm. It is probably not fatal to the round worm, but renders its habitation untenable. As a rule, when a single dose is given it should be administered upon an empty stomach, and the patient should abstain from food for a few hours. A purge should precede and follow its use,

and castor oil is to be preferred because it lessens the probability of poisoning by the santonin. The method most in favor with Eclectic physicians is to give broken doses of the following: ℞ Santonin, gr. v; Podophyllin, gr. j; Milk-sugar, ʒj. Mix. Triturate. Sig.: Divide into ten (10) powders and administer one (1) powder three times a day; follow with a purge. Should the pallor and coldness of the surface, with profuse sweating, dilated pupils, and a peculiar bluish countenance be observed, institute treatment at once to rid the stomach and bowels of the residue of the medicine. The mother or nurse should be warned concerning the yellow coloring and garment staining by the urine, to remove any apprehension of disorder of the kidneys. Remember that even small doses have been attended by convulsions, and that anuria is by no means uncommon. Especially is this true when commercial worm lozenges have been given, and failing to rapidly dissolve, have had a slowly cumulative effect.

Santonin is a nerve stimulant and probably diuretic. It relieves that form of nervousness caused by worms or other irritants where the child picks the nose and is startled in sleep. In retention of urine due to atony of the bladder, and especially that occurring in the advanced stage of acute diseases of children, it may be given in small doses until a free flow of urine is restored. This is one of its most important uses. For the anuria of the newborn, minute doses (1/20 gr.) is one of the most certain of remedies (Scudder), a fact we have more than once verified. It may also be used to stimulate urination after childbirth, where there is difficult micturition, and urinal retention not due to long-continued pressure of the child's head upon the neck of the bladder. The anuria caused by opium is frequently rectified by it. Very small doses often relieve urethral irritation, strangury, nocturnal enuresis, dysuria from debility and vesical tenesmus. This it does by correcting enfeebled innervation. It also relieves irritation of the urethra attended with pain and scalding upon voiding urine. For all these purposes the dose must be fractional. Ellingwood advises it for a long list of troubles dependent upon reflex nervous irritation, including aberrations of the digestive organs with resultant nervous excitement, cough, irritable heart action, and hysterical and impending convulsive attacks. The dose of santonin for a child ranges from 1/20 grain to 2 grains, always avoiding the large dose when possible; for adults from 1/4 to 4 grains; of the trituration (1 in 100) two or three grains. These may be given from one to three times a day. The fractional doses are best for the urinary and nervous troubles; the fuller doses as an anthelmintic.

SAPO.

Soap, Hard Soap, White Castile Soap.

Soap prepared from Sodium Hydroxide and Olive Oil.

Description.—White or whitish, hard bars, easily cut when fresh; or a fine, yellowish-white powder, having a faint, non-rancid odor, and an unpleasant alkaline taste. Soluble in water and alcohol; more readily by the aid of heat.

Preparation.—*Linimentum Saponis*, Soap Liniment (Opodeldoc), (Soap, Camphor, Oil of Rosemary, Alcohol, and water). This liniment is an ingredient of Linimentum Chloroformi (Chloroform Liniment).

Action and Therapy.—*External.* Soap enters into the formation of some pills, as of aloes, rhubarb, gamboge, podophyllin, and other resinous

cathartics, and asafœtida, and those of compound extract of colocynth. Soap is detergent and with water may be used, as indicated, to remove scales and crusts in cutaneous diseases, but is less useful than soft soap for this purpose. It is to be preferred, however, where a very mild action is necessary, being less irritant than the softer preparation.

Internal. Soap is irritant to the stomach, but in small doses may be used as an antacid, and in cases of poisoning by the corrosive mineral acids.

SAPO MOLLIS.

Soft Soap, Green Soap.

Made by heating Hydroxide of Potassium and Cotton Seed Oil, Water, and Alcohol.

Description.—A soft, yellowish-white to brownish-yellow, unctuous mass, having an alkaline taste and a slight but distinctive odor. Soluble in water. *Dose*, 5 to 30 minims, well diluted.

Preparation.—*Linimentum Saponis Mollis*, Liniment of Soft Soap (Tincture of Green Soap). (Soft Soap, Oil of Lavender, Alcohol.)

Action and Therapy.—*External.* Soft soap is detergent and more irritating than hard soap, being more alkaline and containing some free caustic potash. It may be used in the preparation of enemas for the removal of seat worms and to cause an evacuation of feces. Owing to its softening and cleansing properties it is employed to remove dirt, crusts and scales, epithelia, etc., in the treatment of skin diseases. Soap liniment is a good vehicle for the application of other medicines to sprains, stiffened joints, and contusions and other swellings.

Internal. A solution of soft soap may be administered freely in poisoning by the mineral acids, and in smaller amounts (5 to 30 minims, well diluted) in acidity of the stomach.

SARSAPARILLA.

The dried root of (1) *Smilax medica*, Chamisso and Schlechtendal; or (2) *Smilax officinalis*, Kunth, or an undetermined species; or (3) *Smilax ornata*, Hooker filius (Nat. Ord. Liliaceæ). Tropical America, Mexico to Brazil. *Dose*, 30 grains.

Common Names: Sarsaparilla; (1) Mexican Sarsaparilla; (2) Honduras Sarsaparilla; (3) Jamaica Sarsaparilla.

Principal Constituents.—The acrid glucoside *parillin* (*smilacin*, *salseparin*, or *parillic acid*) closely resembling saponin; resin and a volatile oil; and calcium oxalate, etc.

Preparations.—1. *Specific Medicine Sarsaparilla. Dose*, 1 to 30 drops.

2. *Fluidextractum Sarsaparillæ Compositum*, Compound Fluidextract of Sarsaparilla (contains Sarsaparilla, Licorice, Sassafras, Mezereum). *Dose*, 10 to 60 minims.

3. *Syrupus Sarsaparillæ Compositus*, Compound Syrup of Sarsaparilla (contains Fluidextracts of Sarsaparilla, Licorice, Senna, Oil of Sassafras, Oil of Anise, and Methyl Salicylate, Alcohol, Sugar, and Water). *Dose*, 2 to 6 fluidrachms.

Action and Therapy.—Sarsaparilla once held a high reputation as an alterative; it is now considered practically valueless. Almost the only use made of it at present is as a vehicle for iodides and other alteratives. For this purpose the compound syrup is largely preferred. Sarsaparilla is not wholly inert and its long-continued use may cause ulceration of the mucosa of the intestines. Some believe it also to possess an active cardio-sedative principle, probably sarsaponin.

SASSAFRAS.

The bark of the root of *Sassafras variifolium* (Salisbury), O. Kuntze (Nat. Ord. Lauraceæ). Woods of eastern half of North America. *Dose*, 1 to 3 drachms.

Common Name: Sassafras.

Principal Constitutents.—A volatile oil (*Oleum Sassafras*), sassafrid, a decomposition product of tannic acid, resin, and tannin.

Preparations.—1. *Sassafras Medulla*, Sassafras Pith. (Insipid, light, spongy, white and odorless, cylindrical pieces.)

2. *Oleum Sassafras*, Oil of Sassafras. Yellow or reddish-yellow liquid having the taste and aroma of sassafras; soluble in alcohol. *Dose*, 1 to 15 drops, on sugar or in emulsion.

3. *Specific Medicine Sassafras. Dose*, 5 to 30 drops, in syrup or on sugar.

Action and Therapy.—*External.* Oil of sassafras is rubefacient and obtundant, and has been used to discuss wens, and to relieve rheumatic and other painful conditions, as bruises, sprains, and swellings. A mucilage of the pith (℥ij to Water, Oj) was formerly much used in acute ophthalmias. An infusion of the bark is a domestic remedy for rhus poisoning.

Internal. Sassafras tea is a popular alterative, diaphoretic, and carminative. It and the oil are decidedly stimulant. The latter, like other aromatic oils, has been used with more or less success in cystitis with much mucoid flow, and in so-called chronic gonorrhœa. The mucilage of the pith may be used as a demulcent. From ten to fifteen drops of the oil, administered in hot water or upon sugar, will sometimes relieve the pangs of dysmenorrhœa. The chief use of sassafras oil is to flavor pharmaceutic syrups and other preparations.

SCILLA.

The inner, fleshy scales of the bulb of the white variety of *Urginea maritima* (Linné), Baker (Nat. Ord. Liliaceæ), cut into fragments and carefully dried. Coast of Mediterranean Basin and in Portugal and France. *Dose*, 1 to 3 grains; average, 1 1/2 grains.

Common Names: Squill, Squills, Sea Onion.

Principal Constitutents.—*Scillitoxin*, the most active principle, insoluble in water, soluble in alcohol, and a heart poison; *scillipicrin*, a bitter body, sparingly soluble in water; *scillin*, soluble in water, causing vomiting and numbness; and a bitter glucoside *scillain*.

Preparations.—1. *Specific Medicine Squill. Dose*, 1 to 5 drops.

2. *Acetum Scillæ*, Vinegar of Squill (Squill, 10 per cent). *Dose*, 5 to 20 minims.

3. *Syrupus Scillæ*, Syrup of Squill. *Dose*, 10 to 60 minims.

4. *Syrupus Scillæ Compositus*, Compound Syrup of Squill (Hive Syrup). (Contains Fluidextracts of Squill and Senega, and Antimony and Potassium Tartrate.) *Dose*, 5 to 40 minims.

5. *Tinctura Scillæ*, Tincture of Squill (Squill, 10 per cent). *Dose*, 5 to 30 minims.

Specific Indications.—Chronic cough with scanty, tenacious expectoration; dropsy dependent upon a general asthenic condition and without fever; scanty, high-colored urine, with sense of pressure in the bladder; renal overactivity with inability to retain the urine.

Action and Toxicology.—Squill is a powerful drug acting much like digitalis upon the heart muscle, and probably with greater force upon the peripheral vessels, increasing arterial tension. It is a violent gastro-intestinal irritant and it disturbs the stomach more than does digitalis. Even small doses cause nausea and vomiting; and some individuals are so susceptible to its action that it cannot be taken by them in any dose. Squill likewise stimulates the kidneys to increased diuresis, both by acting upon the epithelial cells and by increasing the blood pressure within those organs. Bronchial secretion is increased by it. Fresh squill, when rubbed

upon the skin, is rubefacient, and if the surface be denuded it may be absorbed with poisonous consequences.

Large doses of squill are violently poisonous, causing severe and painful vomiting and purging, gastro-intestinal inflammation, decreased, and sometimes bloody and albuminous urine, with strangury, and not infrequently complete suppression due to the acute nephritis induced. Dullness and stupor or intermittent paralysis and convulsions ensue. Death usually takes place in from ten to twenty-four hours. Some contend that squill acts more powerfully upon the heart muscle than foxglove, and that by overstimulation with excessive doses cardiac arrythmia and heart-block may be induced. Squill, therefore, while usually causing death by gastro-enteritis, may establish a fatal nephritis, or cause a sudden stoppage of the heart.

Therapy.—Squill is a stimulating diuretic and expectorant, and if given in small doses when there is general atony and special lack of tone in the renal and respiratory tracts it is a good medicine. It must be used, however, with care and judgment. If there is the least reason to suspect, or evidence to show, undue renal irritation or inflammation its use should be stopped at once. In very small doses squill allays irritation of mucous membranes and lessens excessive secretion. It was at one time very largely employed for the elimination of dropsical effusion; and still is used for the absorption and removal of pleural, pericardial, and especially peritoneal effusion, but with more care than formerly. In large ascitic collections in curable conditions paracentesis is a more rational measure than long and harsh medication by drastic renal hydragogues.

Squill is one of the most certain remedies for dropsy of cardiac origin, or from congestion (not inflammation) of the kidneys; and is proportionately less valuable where dependent upon structural changes in the renal glands. Nevertheless it frequently is used in chronic nephritis to excite the surviving cells to activity and thus increase the output of urine. When renal dropsy depends upon general atony of the system—the kidneys included—and the disorder is one of functional weakness, squill may be used with good effect. Its diuretic action is increased by digitalis and the alkaline diuretics, notably acetate and citrate of potassium. Squill, in powdered substance, is usually more effective than any of its preparations; therefore the best form of administration is by pill or capsule. When there is a feeble circulation the following is advisable: ℞ Pulv. Scillæ; Pulv. Digitalis, aa, gr. x. Mix. Ft. Pilulæ, No. 10. Sig.: One pill after meals. Squill is contraindicated, even in dropsy, by a dry, hot skin, rapid circulation, elevated temperature, or any evidence of renal irritation or inflammation. But the greater the atony of the general system the more salutary its action. In dropsy requiring urgent relief two or three grains of squill may be given every three hours, withholding the medicine upon the slightest indication of nausea. When it acts strongly as an expectorant it frequently fails to cause increased diuresis. Neither should it be expected to cure when anasarca or ascites is caused by malignant disease or renal destruction. Locke employed for cardiac dropsy, with feeble heart action and weak rapid pulse, teaspoonful doses of infusion of digitalis to which is added two (2) grains of squill, or one (1) drop of specific medicine squill.

Squill has been quite generally used by some physicians for subacute and chronic bronchitis when secretion is scanty and viscid and expectorated with difficulty, and oppositely when the secretions are profuse and debilitating. The dosage should be regulated according to the condition, the fuller doses short of nausea for the former, and minute doses for the latter. These results are attributed to its power to regulate normal equilibrium in the bronchial mucosa. When fever is absent and the sputum scanty and tenacious, the following is useful: ℞ Syr. Scillæ, fl℥j; Syr. Pruni virg., fl℥iij. Mix. Sig.: One teaspoonful four (4) times a day (Locke); and in chronic bronchial catarrh: ℞ Syr. Scillæ, Syr. Senegæ, aa, fl℥j; Syr. Pruni virg., fl℥ij. Mix. Sig.: One teaspoonful every three hours. Syrup of squill has been largely used and is still popular in the domestic treatment of croup, people little realizing the danger invited. We have seen it cause convulsions and prostration in a young child when thus employed. It has also been advised by physicians for emphysema. While of unquestionable value in bronchial affections, one must be guarded in its employment lest more damage be done to the kidneys than good to the respiratory tract.

SCOPARIUS.

The tops of *Cytisus Scoparius* (Linné), Link (Nat. Ord. Leguminoseæ). Europe and the United States. Cultivated. *Dose*, 5 to 15 grains.

Common Names: Broom, Broom Tops, Irish Broom.

Principal Constituents.—The volatile, oily, alkaloid *sparteine* (see *Sparteinæ Sulphas*), and *scoparin*, a diuretic and purgative yellow coloring body.

Preparations.—1. *Infusum Scoparii*, Infusion of Scoparius. *Dose*, 1 to 2 fluidounces.
2. *Decoctum Scoparii*, Decoction of Scoparius (℥ss to Water Oj, boiled down to Oss). *Dose*, 1 to 2 fluidounces.

Action and Therapy.—Excessive doses of broom have produced impaired vision, staggering gait, and profuse vomiting and purging. As the effects of broom are in milder degree practically those of its chief alkaloid, sparteine, see *Sparteinæ Sulphas* for further action and uses. When the latter is not desirable, aqueous preparations of the crude drug may be used; and indeed, they often succeed in causing profound diuresis when the alkaloid fails. As a heart tonic and stimulant sparteine sulphate should be preferred.

Infusion of broom and to a greater degree the decoction, in doses of one ounce every three hours, are decided and certain diuretics for use in dropsies of cardiac origin. The action of scoparin has not been fully determined, but is believed to be both diuretic and purgative. Some believe it to be the real diuretic in scoparius.

SCOPOLAMINÆ HYDROBROMIDUM.

Scopolamine Hydrobromide, Hyoscine Hydrobromide, Scopolamine Bromide. [Formula: $(C_{17}H_{21}O_4N.\ HBr+3H_2O)$.]

The hydrobromide of the lævorotatory scopolamine, obtained from various solanaceous plants, notably from *Scopola Carniolica*, a plant of Southern Europe. Scopolamine is an alkaloid identical with and also known as Hyoscine (see *Hyoscyamus*). *Dose*, (average) 1/200 to 1/100 grain.

Description.—Odorless and colorless, transparent, slightly efflorescent crystals (sometimes large). Very soluble in water and alcohol, slightly soluble in chloroform; ether does not dissolve it. ☞ Great care must be used in tasting it, and then only in very dilute solutions.

Action and Toxicology.—The action of scopolamine is that of hyoscine, and closely allied to that of the combined alkaloids of hyoscyamus. (See *Hyoscyamus.*) The symptoms of poisoning and the treatment are the same as those of Atropine and Belladonna (which see).

Therapy.—Scopolamine (hyoscine) is anæsthetic and profoundly hypnotic. These properties have been invoked to aid in alleviating the pains of childbirth and in securing general anæsthesia for operative purposes. In combination with morphine these activities are intensified, less of each, when combined, producing greater effects correspondingly than when each is given alone, if indeed it is not a somewhat different effect. The use of these drugs to facilitate and render labor painless is of comparatively recent introduction. It has found many enthusiastic supporters, but as it is a far from safe procedure the mass of the profession ignores its power in this direction. When successful the patient sleeps between pains, and is asserted not to feel them though she is said to groan as if in pain. But when the ordeal is over there is no remembrance of having suffered. While several mishaps have occurred, as profound depression and even the death of the mother, it is said to be more dangerous to the child. Therefore it has not become generally popular and in most quarters is on the wane. This is the famous "twilight sleep" heralded to the world as the greatest boon that ever came to the parturient's relief. Some use a preparation containing hyoscine, morphine, and cactin (H. M. C.). All physicians agree in claiming that the patient must be carefully watched, and it is preferred that it be used in a hospital or lying-in institution in preference to the home.

The method is practically as follows: When it is determined that labor is actually in process, a hypodermatic injection of scopolamine, 1/150 grain with morphine, 1/6 grain, are injected together. This is not done until the pains are close and lasting at least a half minute. In about one-half hour the drugs will have produced a somnolent state which continues between pains, the patient apparently arousing but not appreciating suffering when they come on. If pain, however, is actually felt and continues to be felt, another dose of the scopolamine *alone* is repeated. If the woman still has any remembrance of pain or effort, another dose of the scopolamine alone is administered. The patient is pre-assured of safety and comfort, the room is darkened and no noises are permitted—nothing that will in any way startle the sleeper. Labor then progressing normally, the patient finally comes to without any recollection of the ordeal through which she has passed.

Scopolamine (1/100 grain) and morphine (1/12 grain) have been used to produce general surgical anæsthesia. The drugs are administered combined in the above dosage, at intervals of one to three hours, until from two to four doses have been given. Then the patient is usually ready for the operation. It is not much favored for this purpose on account of the manifest danger of the method, and when the choice of etherization can be made. It is not likely to displace either ether or chloroform as a general anæsthetic. Sometimes one or two doses are administered to apprehensive patients when about to be anæsthetized, the completion of insensibility being secured by ether or chloroform. The advantages claimed for these

methods is lessening of fear, the use of smaller quantities of ether or chloroform, decreased likelihood of post anæsthesia vomiting, and the induction of several hours sleep after the operation; the disadvantages are its uncertain safety, and sometimes, death.

SCUTELLARIA.

The fresh green herb of *Scutellaria lateriflora*, Linné (Nat. Ord. Labiatæ). Common in damp situations throughout the United States. *Dose*, 5 to 30 grains.

Common Names: Scullcap, Skullcap, Madweed.

Principal Constituents.—A volatile and a fixed oil and an unnamed, bitter, crystallizable glucoside.

Preparation.—*Specific Medicine Scutellaria. Dose*, 5 to 30 drops.

Specific Indications.—Nervousness attending or following illness, or from mental or physical exhaustion, or teething; nervousness with muscular excitation; tremors; subsultus tendinum; hysteria, with inability to control muscular action; functional heart disorders of a purely nervous type, with intermittent pulse.

Action and Therapy.—Scutellaria is calmative to the nervous and muscular systems and possesses feeble tonic properties. By controlling nervous irritability and muscular incoördination it gives rest and permits sleep. It may be exhibited to advantage during acute and chronic illness to maintain nervous balance, control muscular twitching and tremors, and is sometimes effectual in subsultus tendinum during grave prostrating fevers. Too much, however, must not be expected from it in the latter condition; nor can it be expected to aid much in delirium tremens, and not at all in epilepsy and paralysis agitans, in both of which it has been injudiciously advised. It appears to be most useful in chorea when reinforced by the addition of macrotys and valerian; in restlessness following prolonged sickness; and in functional heart disorders of a purely nervous character, with intermittent pulse whether accompanied or not by hysterical excitement. When insomnia is due to worry, or nervous irritability or even exhaustion, relief may be expected from it. It once had a great reputation as a cure for hydrophobia, based upon the reports of New Jersey physicians, a claim which time has totally failed to sustain.

SENECIO.

The whole plant of *Senecio aureus*, Linné (Nat. Ord. Compositæ). Northern and western parts of the United States. *Dose*, 5 to 60 grains.

Common Names: Golden Senecio, Life Root, Ragwort, Female Regulator, etc.

Principal Constituents.—Probably an acrid resin and a bitter and tannin; it has not been satisfactorily analyzed.

Preparation.—*Specific Medicine Senecio. Dose*, 5 to 60 drops.

Specific Indications.—Atony and relaxation of the pelvic contents, with dragging painful sensations; uterine enlargement, with uterine or cervical leucorrhœa and impairment of function; vaginal prolapse; slight uterine prolapse; pelvic weight and vascular engorgement; increased flow of mucus or muco-pus from weakness; suppressed or tardy menstruation; pain, soreness, and bearing down of the uterus; vicarious menstruation; difficult and tardy urination in both sexes. In the male tenesmic micturition, testicular dragging, and pelvic weight. In both sexes, dyspepsia,

with flatulence after meals; cardialgia, associated with sour stomach and increased flow of gastric juice.

Therapy.—Senecio is a remedy of decided value in the treatment of diseases of women. It was formerly much employed, but in the onward movement of therapeutics seems for some reason to have passed into unmerited neglect. Without doubt this is due to failure to observe and prescribe it according to its specific indications, and somewhat to its tardy action. To get results from senecio it must be given in appreciable doses for a long period, and while slow, its results justify its use. A general relaxed condition of the female generative tract, with or without mucous or mucopurulent discharge, or vaginal or uterine prolapse, is the direct indication for its selection. Atony is the key to its use. The parts lack vigor and tone, or may be irritable and hyperæmic; at any rate, the pelvic circulation is poor and the whole pelvic floor seems about to let the pelvic contents escape. The uterine ligaments are lax, and the prolapses benefited are those partial displacements due to the weakening of the ligaments and surrounding tissues. Senecio is an ideal emmenagogue and the best single remedy for the amenorrhœa of debility. As such for amenorrhœa in the young in whom the menstrual function is not yet well established, we know of no better or more prompt agent than senecio. We select it with as great certainty as we would macrotys for muscular pain, or bryonia for pleuritic stitches. It matters little, however, what the non surgical female disease, so long as one is guided by the indications, senecio will not be found wanting in power to improve or to cure. It is with certainty a leader in gynecic therapy. It relieves irritation, imparts tone and vigor, and restrains undue and vitiated secretions. Atony of the ovaries with impairment of function is always present in cases requiring senecio. There is also perineal weight and fullness, and in chronic cases an enlargement of the womb, with cervical leucorrhœa. Dysmenorrhœa, menorrhagia, metrorrhagia, chlorosis, functional sterility, leucorrhœa, dyspepsia, and the capillary bleeding of hæmaturia and the bloody discharges of albuminuria are the cases in which it is also especially indicated and in which more or less success may be expected from it. While holding the greatest reputation in diseases and disorders of the female, it is of some, though relatively less, usefulness in functional aberrations of the male reproductive organs, sometimes relieving pelvic weakness, with sense of dragging and testicular pain, and frequent and painful urination. The dose of specific medicine senecio, the best preparation of it, is from five to sixty drops in water, three or four times a day.

SENEGA.

The root of *Polygala Senega*, Linné (Nat. Ord. Polygalaceæ). Indigenous to the United States. *Dose*, 5 to 20 grains.

Common Names: Senega, Senega Snakeroot, Seneka Root, Seneca Snakeroot.

Principal Constituent.—Saponin (*Senegin*).

Preparation.—*Specific Medicine Senega. Dose*, 1 to 20 drops.

Specific Indications.—Relaxed respiratory mucosa and skin, with deep, hoarse cough, excessive secretion; mucous rales, nausea and vomiting; cough of chronic bronchitis; bronchorrhœa.

Action and Therapy.—Senega has an acrid taste and leaves a disagreeable sensation when swallowed. In ordinary doses it is sialagogue, stimulant, diuretic, expectorant, and is reputed emmenagogue. It may be used in subacute forms of cough as is found in chronic bronchitis with profuse secretion. It is contraindicated in active febrile conditions. Dropsy of renal origin has been benefited by it, but it is of no value when due to cardiac lesions. It is little used, and then chiefly in syrups containing other medicaments. It is an ingredient of the once celebrated Coxe's Hive Syrup, a vicious preparation now represented by compound syrup of squill, and containing also squill and tartar emetic.

SENNA.

The dried leaflets of (1) *Cassia acutifolia*, Delile, or of (2) *Cassia angustifolia*, Vahl (Nat. Ord. Leguminosæ). (1) Eastern and central Africa; (2) cultivated from eastern Africa to India. *Dose*, 60 to 120 grains.

Common Names: Senna, (1) Alexandria Senna, (2) India or Tinnivelly Senna.

Principal Constituents.—An amorphous, water-soluble, sulphurated glucoside—*cathartinic acid* (which may be split into cathartogenic acid and glucose), *emodin*, sennacrol and sennapicrin (water-insoluble glucosides), and chrysophanic acid.

Preparations.—1. *Specific Medicine Senna. Dose*, 5 to 60 drops.

2. *Infusum Sennæ Compositum*, Compound Infusion of Senna (Black Draught). (Senna, Manna, Magnesium Sulphate, Fennel, Boiling Water.) *Dose*, 2 to 8 fluidounces.

3. *Pulvis Glycyrrhizæ Compositus*, Compound Powder of Glycyrrhiza (Compound Licorice Powder), (Senna, Glycyrrhiza, Oil of Fennel, Washed Sulphur, Sugar). *Dose*, 1 to 2 drachms.

4. *Pulvis Jalapæ Compositus*, Compound Powder of Jalap (Antibilious Physic). Contains Senna. See *Jalapa*.

Specific Indications.—Flatulence and colic; a laxative for non-inflammatory conditions of the intestinal tract.

Action and Therapy.—Senna is a manageable and useful cathartic producing copious yellowish-brown evacuations, and causing considerable griping when used alone. While it influences the whole intestinal tract, exciting peristalsis as it passes along, the greater action is exerted upon the colon. This renders it a certain purgative, for by this sequence the whole canal is the more readily emptied. It does not produce after-constipation, as does rhubarb and some other laxatives; and it may purge a nursing infant when administered to the mother. Senna is neither sedative nor refrigerant, but if anything somewhat stimulant, and is, therefore, not to be given in irritated or acutely inflamed conditions of the alimentary tube nor when there is great debility, or hemorrhoids, or prolapse of the rectum. Nothwithstanding, it is effectual and safe to cleanse the bowels at the beginning of fevers, when such an effect is desired. It may be used as a laxative or more complete cathartic in children and adults when a severe action is not indicated. In most individuals it occasions nausea, tormina and flatulence when given alone, as in senna tea, but these effects may be mitigated by infusing it with coffee, or by the addition of cloves, ginger, peppermint, cinnamon, or other aromatic corroborants. Cream of tartar added to it increases its action, producing a hydragogue and refrigerant effect, while bitters in general seem to increase its action. Senna is one of the anthracene group of cathartics, and its action is largely, though not wholly, due to the presence of cathartinic acid. The latter taken up

by the blood, or injected, is emptied into the intestinal canal, thereby causing or prolonging catharsis.

Compound Powder of Jalap. A most thorough action may be obtained from the Antibilious Physic, especially in auto-intoxication, and intestinal toxæmia, giving rise to a violent, burning, diffuse rash, such as sometimes follows prolonged constipation, or the ingestion of tainted foods —particularly sea foods and fruit. This preparation is less irritant than senna alone, and unless there is very marked gastro-intestinal inflammation, it is seldom contraindicated. The physicing dose is one drachm, in hot water, cooled and sweetened; or milk, lemonade, or coffee may be used as a vehicle. It may also be given in large-sized gelatin capsules.

Compound Licorice Powder. A pleasant and efficient laxative in doses of 30 to 120 grains (average 60), given in plenty of water, at bedtime, for the general cleansing of the bowels of undigested material, relieving headache arising therefrom; and an admirable laxative for the pregnant and parturient woman, and for children. It may be given in water, or the ready-prepared lozenges may be used, the patient partaking also of plenty of water.

SERENOA.

The fruit of *Serenoa serrulata*, Bentham and Hooker (Nat. Ord. Palmacæ). Atlantic Coast from Florida to South Carolina. *Dose*, 10 to 60 grains.

Common Name: Saw Palmetto.

Principal Constituents.—An aromatic oil (Oil of Saw Palmetto) and sugar.

Preparation.—*Specific Medicine Saw Palmetto. Dose*, 10 to 60 drops.

Specific Indications.—Relaxation with copious catarrhal secretion; lack of development or wasting of testicles, ovaries, or mammæ; prostatic irritation with painful micturition, and dribbling of urine, especially in the aged; tenderness in the glands and other parts of the reproductive organs.

Action and Therapy.—Saw Palmetto is a nerve sedative, expectorant, and a nutritive tonic, acting kindly upon the digestive tract and tending to improve the appetite, digestion, and assimilation. Its most direct action appears to be upon the reproductive organs when undergoing waste of tissue; in some nutritional way it is asserted to enlarge the breasts, ovaries, and testicles, while the paradoxical claim is also made that it reduces hypertrophy of the prostate. This can only be explained, if, indeed, it has such opposite effects, by assuming that it tends toward the production of a normal condition, increasing parts when atrophied, and reducing them when unhealthily enlarged. Evidence is forthcoming that it alleviates much of the prostatic suffering of the aged, and this is probably due to its relieving urethral irritation, thereby reducing a swollen condition not really amounting to hypertrophy. It is asserted to increase the tonus of the bladder, and help to better contraction and more perfect expulsion of the contents of that viscus. Tenesmic pain especially is relieved. It is further, and rationally, indicated to relieve dull aching, throbbing pain in the prostatic urethra and to control excessive mucoid and prostatic discharges. The gleety results of a badly treated gonorrhœa sometimes yield to it. As it tones relaxed tissue this probably explains its asserted value in so-called uterine hypertrophy, the latter being more properly a large, loosely relaxed and flabby organ, actively leucorrhœal. It has been recorded also

that it increases the sexual appetite and restores lost power from excesses, in both man and woman; and to have given relief in ovaritis, ovaralgia, orchitis, orchialgia, and epididymitis. Its best action is that of a nutritive tonic to wasting organs and to control irritation and mucoid discharge.

SERPENTARIA.

The rhizome and roots of (1) *Aristolochia Serpentaria*, Linné, and of *Aristolochia reticulata*, Nuttall (Nat. Ord. Aristolochiaceæ). Eastern half of the United States; the latter chiefly in the southwest. *Dose*, 1 to 30 grains.

Common Names: (1) Virginia Snakeroot; (2) Red River or Texas Snakeroot.

Principal Constituents.—A volatile oil containing *borneol* ($C_{10}H_{18}O$) and a *terpene* ($C_{10}H_{16}$), and resins.

Preparation.—*Specific Medicine Serpentaria. Dose*, 1 to 30 drops.

Specific Indications.—Renal torpor, the result of cold; fullness of chest with dyspnœa; sensation of weight and dragging in the loins, with scanty renal secretion; severe sore throat, with tendency to destruction of tissue; cutaneous torpor.

Action and Therapy.—In small doses Virginia snakeroot stimulates the appetite and promotes digestion; long continued it tends to derange digestion producing nausea, emesis and intestinal griping and tenesmus. In full doses it stimulates to a considerable degree, but may occasion gastro-intestinal discomfort with nausea, vomiting, headache, and drowsiness, but with disturbed sleep. The warm infusion is decidedly diaphoretic. Under the latter action it is sometimes useful to hasten the eruption in tardy exanthemata. Small doses, given for a brief period, are beneficial in atonic dyspepsia. After periodic fevers it may be administered with cinchona or quinine to overcome depression and give tone to the debilitated system. When renal torpor or menstrual tardiness is due to cold, serpentaria will act as a stimulant diuretic and as an emmenagogue. The best use for serpentaria, in our opinion, is for the severely congested but sluggish and very sore *angina of scarlatina*. It may be used both as a gargle and internally. As a rule, serpentaria is contraindicated by active fever or severe inflammation; but is a remedy of much value in atonic states.

SERUM ANTIDIPHTHERICUM.

Antidiphtheric Serum, Diphtheria Antitoxin.

A fluid, according to the U. S. P., separated from the coagulated blood of the horse, *Equus Caballus* (Fam. Equidæ), or other large domestic animal, which has been properly immunized by inoculation against diphtheria toxin, and has a potency of not less than 250 antitoxin units per mil. The standard of strength (units of antitoxic power) must be that established by the Hygienic Laboratory of the United States Health Service.

[*Antitoxic Unit* or *Immunizing Unit.* "The amount of antitoxin required to neutralize one hundred times the quantity of the standard toxin that is sufficient to kill a guinea-pig weighing 200 Gm." (Dorland's *Medical Dictionary*).]

Description.—A nearly odorless (except when an antiseptic preservative has been used), yellowish or yellow-brown, transparent or slightly clouded fluid. A granular deposit is sometimes present. It must be sterile, prepared from healthy animals, free from toxins or other bacterial products, and must not exceed 20 per cent in total solids. Not more than 1/2 per cent of phenol or cresol may be present as an antiseptic preservative. *Dose*, Prophylactic or protective, 500 to 1,500 units (average, 1,000 units); Hypodermatic, 3,000 to 20,000 units (average, 10,000 units). This serum loses in potency from month to month and should not be used after a year old.

Other Forms of Diphtheria Antitoxin.

1. *Serum Antidiphthericum Purificatum*, Purified Antidiphtheric Serum (called also Antidiphtheric Globulins, Diphtheric Antitoxin Globulins, Concentrated Diphtheria Antitoxin, Refined and Concentrated Diphtheria Antitoxin). A fluid obtained from the plasma (blood serum) of the horse, or other large domestic animal, immunized against diphtheria toxin, containing in water solution only the separated antitoxin-bearing globulins preserved by adding sodium chloride to make a finished solution bearing 0.6 to 0.9 per cent of salt. Potency, 250 antitoxic units per mil. A nearly odorless (except when preservative is used), transparent or slightly opalescent fluid, sometimes viscous, and having a slight granular or ropy deposit. It must conform to same governmental requirements as the ordinary serum. Dose, Protective or prophylactic, 500 to 1,500 units (average, 1,000 units); Hypodermatic, 3,000 to 20,000 units (average, 10,000 units).

2. *Serum Antidiphthericum Siccum*, Dried Antidiphtheric Serum (Dried Diphtheria Antitoxin). An odorless substance in orange-colored or yellowish flakes or lumps, or a yellowish-white powder, forming an opalescent, slightly sticky solution with nine parts of distilled water. It may be more readily dissolved in more distilled water or in physiologic salt solution. Dried diphtheria antitoxin is prepared by evaporation of either the ordinary or the purified diphtheria antitoxin. It is more permanent than the solution. Potency, not less than 4,000 units per gramme. When ready for use it must be dissolved in water previously boiled and cooled, and used *at once*. Any remaining portion not so used must be discarded. Like the antitoxic sera it must conform to U. S. Government requirements. *Dose*, Protective or prophylactic, 500 to 1,500 units (average, 1,000 units); Hypodermatic, 3,000 to 20,000 units (average, 10,000 units).

Specific Indications.—Diphtheria (curative); suspected persons exposed to diphtheric infection (prophylactic).

Action.—The production of both the diphtheria and tetanus antitoxin is effected by graded and repeated injections of the corresponding toxins of the diphtheria and tetanus bacilli into the horse. The creature thus becomes gradually highly immune to these toxins and furnishes an abundance of antitoxic bodies that, when properly injected, may render the beneficiary immune or at least furnish it with immunizing antitoxin. From time to time tests are made to determine the antitoxic content of the animal's blood. After a period, usually of several months, the required high content is reached, and the horse is bled under the strictest of antiseptic precautions. The plasma (separated from the cellular contents of the blood) with its contained antibodies, when responding to the required governmental unit test per mil, constitutes *Antitoxin*. When further refined and concentrated and standardized, according to U. S. Public Health Service requirements, it constitutes when of fluid form, respectively, Purified Diphtheria Antitoxin or Purified Tetanus Antitoxin, or when dry the corresponding Dried Diphtheria Antitoxin or the Dried Tetanus Antitoxin.

The cells of the human body, in order to utilize food, or similar bodies, throw out what are termed "receptors", having an affinity for such a food and that kind only, from which the body appropriates that which it needs. Poisons, particularly those of a protein type, such as toxins, unite similarly with receptors of the cells, but to kill rather than to nourish them. If, however, an antitoxin be administered, these receptors given off by the cells are met by the free-floating antibodies so furnished instead of by the toxins, which must unite in order to destroy, and thus is prevented the mastery and death of the cells by the toxins of the disease in question. This, then, is the reason antitoxins are administered in such diseases as diphtheria and tetanus—to prevent the union of disease toxins with the cells and thus destroy them and the life of the patient. The fight is between the toxin and the furnished antitoxin, and the latter embracing the former

renders it helpless and inoccuous. The immunizing effects of antitoxin last but a few weeks.

Therapy.—Diphtheria antitoxin is without question the most potent antagonist of *diphtheria*. Its use has wrought a marvelous transformation in the therapy of that disease. In fact, in diphtheria antitoxin we have the one serum of established worth, and so far in the history of serology, perhaps, the only one of indubitable value. To be of greatest service it should be administered early in the disease, not later than the second day, if possible, and without waiting for bacteriologic findings. Many recommend repeated doses, ranging in time anywhere from four hours to daily, but in our experience seldom more than one dose has been needed. Large doses of the globulins (these are in reduced bulk) are more effective than small doses, no more disturbing, and results more prompt. In no instance should an old antitoxin be used, but always as fresh a product as can be obtained.

Not alone is diphtheria antitoxin curative, but is also presumably prophylactic. For the latter purpose from 1,000 to 1,500 units (according as prospects of the situation seem to require) should be given each exposed child. For curative purposes not less than 5,000 units, even in the youngest child (very young infants seldom contract diphtheria), and if a case is very severe or the larynx and nasal fossæ are involved, 10,000 units should be given as an initial dose.

The good effects of antitoxin are observed in a day's time. The fever abates, the restlessness is subdued, limitation and rapid exfoliation of the membrane takes place, and the urinary secretion is reëstablished when scanty. Soreness and lameness at the site of injection is to be expected, but it disappears in the course of a few hours. Other internal treatment should not be neglected, as small doses of aconite for excessive fever, belladonna for congestion, phytolacca for glandular engorgement, potassium chlorate for fetor, and echinacea for the septic state due to streptococci, which are often present. Locally, potassium permanganate, Loeffler's solution (see *Liquor Ferri Chloridi*), asepsin, echinacea, potassium chlorate, with hydrastis or peroxide of hydrogen may be used in proper solutions for cleansing purposes, in the form of gargles, but better as sprays and washes. Indeed, the local treatment should not be neglected as it is a most important measure.

Antitoxins come ready prepared for immediate use, in container-syringes, with accompanying directions for their use. The physician has only to observe the strictest aseptic precautions in administering them.

SERUM ANTITETANICUM.

Antitetanic Serum, Tetanus Antitoxin.

The blood serum of the horse (*Equus Caballus*), or other large animal immunized against the toxin of the tetanus bacillus. It must have a potency of not less than 100 units per mil., and conform in all respects to the requirements of the United States Law and United States Public Health Service.

Description.—A nearly odorless (except when preservative is used), yellowish or yellowish-brown, clear solution or slightly cloudy with occasionally a granular deposit. It must be kept at a low temperature, 4.5° to 15°C (40° to 59°F). It gradually loses potency. *Dose*, Protective, 1,000 to 2,000 units (average 1,500 units); Hypodermatic, 3,000 to 20,000 units (average, 10,000 units).

Other Forms of Antitetanic Sera.

1. *Serum Antitetanicum Purificatum*, Purified Antitetanic Serum (Antitetanic Globulins, Concentrated Tetanus Antitoxin). The antitoxin-bearing globulins immunized against tetanus toxin, dissolved in physiologic salt solution. Potency not less than 100 units per mil. A nearly odorless (except when a preservative is present), transparent or slightly opalescent, more or less viscous fluid, with or without a slight granular or ropy deposit. It must conform to U. S. Government requirement. *Dose*, Same as Tetanus Antitoxin, see page 631.

2. *Serum Antitetanicum Siccum*, Dried Antitetanic Serum (Dried Tetanus Antitoxin). Odorless, yellowish or orange-colored flakes or lumps, or yellowish-white powder. Solubility similar to that of Dried Diphtheria Antitoxin. Potency not less than 1,000 units per gramme. It should be used under the strictest antiseptic precautions and in same manner as for the latter. If properly preserved it does not lose potency like the liquid sera. *Dose*, Same as for the Antitetanic Sera, see page 631.

Action and Therapy.—Tetanus is caused by the tetanus bacillus, whose liberated toxins, by acting upon the spinal cord, produce violent tetanic convulsions. As tetanus antitoxin antagonizes the tetanus toxin after the manner of the action of the diphtheria antitoxin (which see), the early use of the serum is invoked to prevent the spasms, if not already established, and to cure, if possible, after the convulsions have supervened. It is regarded a better prophylactic than curative agent for the reason that the tetanus toxin quickly reaches and combines with the nerve tissues, when it is too late for the antitoxin action of the antitetanic serum. Another reason for its difficult action is attributed to the diverse routes by which the toxin and the antitoxin reach the nerve tissues—the former after traversing the blood and lymph currents, passing by way of the nerve fibres, the latter by way of the blood stream alone. This delayed union permits of damage before the toxins can be overwhelmed by the antibodies. If used very early, immediately after the wound, if possible, it is said to be as effective and as certain as diphtheria antitoxin; if used late, little good need be looked for. Every minute counts in the success of tetanus antitoxin therapy. The powder may be dusted upon suspected wounds for its prophylactic effects. The experience of the wounded soldiers in the World War justifies the use of antitetanic serum in gun-shot wounds, punctures, injuries from splinters and nails, ragged cuts from barbed wire, tin or glass, and wounds contaminated with stable filth or manured garden soil. A prophylactic dose of antitetanic serum lasts from ten days to three weeks; in unusually foul wounds about a week. As a prophylactic some claim that this serum is more certain than the diphtheria antitoxin. Large doses yield 20 per cent more of recoveries than small doses. Antitetanic serums come put up in sealed container-syringes ready for immediate use, with accompanying directions.

SINAPIS ALBA.

The ripe seeds of *Sinapis alba*, Linné (Nat. Ord. Cruciferæ). Asia and South Europe; cultivated. *Dose* (emetic), 1 to 3 drachms, with plenty of water.

Common Names: White Mustard, Yellow Mustard.

Principal Constituents.—A bland, fixed oil, average of 25 per cent; the glucoside *sinalbin*, the most important constituent, and myrosin, an enzyme which converts sinalbin into an acrid, and other bodies. Volatile oil of mustard is not obtained from white mustard.

Description.—A yellowish or light, brownish-yellow powder, odorless and mildly pungent and acrid to the taste. *Dose*, 1 to 3 drachms (as an emetic).

SINAPIS NIGRA.

The ripe seeds of *Brassica nigra* (Linné), Koch (Nat. Ord. Cruciferæ). Asia and southern Europe; cultivated. *Dose* (emetic), 1 to 3 drachms.

Common Names: Black Mustard, Brown Mustard.

Principal Constituents.—Fixed oil of mustard (average of 35 per cent); *sinigrin* (a glucoside) and myrosin, which in the presence of water and distillation converts the former into glucose, a potassium salt, and Volatile Oil of Mustard (*Oleum Sinapis Volatile*), (see below) an oil not derived from white mustard.

Description.—A pale-brown or greenish-brown powder, having an acrid, pungent taste, and developing, when moistened, a pungent and irrespirable odor. *Dose*, 1 to 3 drachms (as an emetic).

Preparation.—*Emplastrum Sinapis*, Mustard Plaster. Powdered black mustard deprived of its fixed oil mixed with solution of rubber and spread upon paper or other fabric. It is to be moistened with tepid water before being applied.

Derivative.—*Oleum Sinapis Volatile*, Volatile Oil of Mustard. An oil derived from black mustard or prepared synthetically and consisting largely of Allyl Isothiocyanate. A colorless or pale-yellow liquid having a very pungent and irrespirable odor and an acrid taste. The greatest caution should be taken when smelling this liquid; and it should not be tasted except when greatly diluted. *Dose*, 1/12 to 1/4 drop. There is no justification for its internal use.

Specific Indications.—*External.* Deep-seated pain and inflammations; vomiting from gastric irritability; and repressed secretion.

Internal. Emetic for poisoning by narcotics.

Action and Toxicology.—Volatile oil of mustard is an extremely diffusible and penetrating irritant, quickly exciting heat and burning pain through its dilating action upon the peripheral vessels and irritation of the sensory nerve endings. If too long applied it will blister, and cause inflammation, sloughing and deep ulceration; and not infrequently gangrene. To a degree local anæsthesia is produced in some instances and the patient is then not aware of the possible destruction of tissue. Removed in time only induration is caused, followed sometimes by desquamation. Mustard applied in the same manner acts similarly but more slowly and with gradually increased intensity, as the volatile oil is but slowly formed from the moistened powder by the action of its ferment myrosin. The local action of mustard may stimulate reflex cardiac and respiratory activity in sufficient force to arouse one from an attack of fainting. Internally, mustard is a stimulating condiment and appetizer, and excites gastric activity and promotes digestion. If the amount be large, however, it is intensely irritant and promptly causes vomiting. This is not attended by depression, however, owing to the fact that both the breathing and circulation are stimulated by its reflex action upon the respiratory centers and the heart. Overdoses may induce acute gastritis, and if long continued chronic gastric catarrh. The volatile oil is an intense irritant poison, producing intense burning pain and destruction of tissue. Profound depression, renal hyperæmia, and insensibility precede death.

Therapy.—*External.* The mustard plaster and the sinapism (mustard poultice) are popular with physicians and the laity as rubefacients and counterirritants to relieve deep-seated pain and inflammation, check vomiting, reëstablish suppressed urine, excite and restore menstruation, to arouse from insensibility in narcotic poisoning, syncope and asphyxia, and as a derivative generally. For this purpose they should be applied *temporarily* only and their effects carefully watched. Sometimes they act

best when applied a little remote from the actually involved tissue, and they are necessarily so used when the internal organs are the seat of disease. For the purposes named the mustard plaster or sinapism may be applied to the chest and the abdomen in acute inflammation of the viscera, to the epigastrium and spine to check persistent vomiting from gastric irritability, and in gastralgia, gastritis, flatulence, to the abdomen in colic, over the loins in suppression of urine, lumbago and backache, to the nape of the neck in congestive headache and cerebral congestion, to the spine, legs, and soles of the feet to arouse from apoplexy, stupor, and coma, to the praecordial region in syncope, and locally to the areas involved in myalgia, neuralgias, muscular rheumatism, and inflammations of the joints. They should be used with great care upon children and debilitated individuals. Never more than one fourth mustard and three fourths white or rye flour should be employed in either, and the strength of the poultice can be regulated better in this manner than by using the ready prepared plaster. However, for general purposes the plaster, mustard leaves or papers, are most convenient, always ready for immediate use, and quickly and cleanly applied, first dipping them in water. It must be remembered that they are exceedingly energetic and usually stronger than a domestically prepared poultice. When necessary to use extra precaution, and in children, it is best to interpose a moistened layer of thin fabric between the skin and the application. When long and gentle action is desired, about one-twentieth part of mustard may be incorporated into flaxseed or other poultices. A blanket wrung from hot mustard water is sometimes used to restore retrocession of eruption in the exanthems, but special care should be had in scarlet fever, lest the already endangered kidneys be damaged. It should only be used as a last resort in this disease, but is less liable to do harm in measles. Warm water increases the activity of mustard applications; and the smarting sensation arising from the local use of mustard may be mitigated by sponging the parts with cold water, or spraying with ether.

Internal. The only rational use for mustard internally is to cause emesis in cases of narcotic poisoning. Besides acting as a prompt emetic, there is the added value of reflex stimulation of the heart and breathing organs, and consequently no depression. It should not be used for irritant or corrosive poisons. Its employment would seem rational in food poisoning (bromatotoxism) when there is depression of the nervous system and no irritation or gastro-intestinal inflammation present, provided there is still poisonous food in the stomach. As an emetic, from one to four teaspoonfuls may be administered in plenty of luke-warm water. It acts promptly and thoroughly, except in cases where the vomiting apparatus is paralyzed. In such instances the stomach pump or lavage tube should be used.

Derivative of Oil of Mustard.

Thiosinamine. This is derived from oil of mustard or from oil of horseradish by acting upon it with ammonia water in the presence of alcohol and heat. Crystals form which are soluble in water (2) and alcohol and ether. *Dose,* 1/2 to 1 grain. This substance is asserted to have the remarkable property of dissolving keloidal and scar tissue when injected into the parts involved; it is also said to have some solvent effect upon them even when ingested. From its local use a reaction similar to that caused by tuberculin is experienced. The parts become darkly congested and swollen, there is great local pain, nausea and vomit-

ing may occur, and there is a greatly increased secretion of urine. From fifteen to twenty minims of a 10 per cent solution in absolute alcohol are injected every third or fourth day, directly into keloid scars, and lupus, and other malignant growths. Hare warns that care be had that no possible old inflammatory focus, especially of tubercular origin, be overlooked in using it in lupus, lest the original malady becomes activated, natural protective barriers be broken down, and it induces in partly healed lesions an active inflammation. The reaction and absorption caused by this substance are said to be rapid when injected; slower when given by mouth.

It may be used internally for the slower removal of scar tissue, induration of the tympanic membrane and to absorb corneal opacities. It is said to act upon abnormal tissue in preference to normal, a claim that requires confirmation. More than the recommended doses are apt to disorder the stomach, and altogether the drug has failed, whether given internally or used locally, to interest those most concerned—the cosmetic surgeons.

SODII ACETAS.

Sodium Acetate. (Formula: $NaC_2H_3O_2+3H_2O$.)

Description.—Colorless crystals, or a crystalline, granular powder, without odor (or slightly acetous), and having a cooling, saline taste. Warm, dry air causes it to lose water of crystallization. Freely soluble in water, and less so in alcohol. *Dose*, 20 grains to 2 drachms.

Action and Therapy.—Sodium acetate is less diuretic than potassium acetate, but has an advantage in being less deliquescent and less apt to provoke gastric disturbance. It is used for practically the same purposes as the potassium salt, but is less efficient in rheumatic conditions. Being converted into a carbonate in the body it alkalizes the urine.

SODII BENZOAS.

Sodium Benzoate. (Formula $NaC_7H_5O_2$.)

Description.—A permanent, white powder, either non-crystalline or crystalline or in granules, without odor, and sweetish, subastringent taste. Freely soluble in water, and less so in alcohol. *Dose*, 5 to 30 grains.

Action and Therapy.—The action and uses of sodium benzoate are practically those named under Benzoic Acid, which see. By some it is especially valued in pharyngitis and in bladder disorders when the urine is strongly ammoniacal. Owing to the fact that it retards the action of enzymes, even when used in minute quantities, it has been objected to as a preservative of food, a use which was very common until very recently. Benzoate of sodium behaves somewhat like the salicylate of sodium in articular rheumatism and septic diseases, but it is far less effective. Webster advises its use in the albuminuria of pregnancy. Fyfe suggests its value, with rhubarb, as a cholagogue.

SODII BICARBONAS.

Sodium Bicarbonate, Baking Soda, Soda, Bicarbonate of Soda. (Formula: $NaHCO_3$.)

Description.—A white, odorless powder having a cooling and feebly saline taste. It is slowly decomposed by moist air. Soluble in cold water, but when added to hot or boiling water loses carbon dioxide and finally becomes sodium carbonate. *Dose*, 1 to 40 grains.

Specific Indications.—Pallid mucosa with a filmy white coat upon the tongue; acid dyspepsia; hyperchlorhydria; sour eructations; sour, green diarrhœa; cardialgia; flatulent colic with acidity; sick headache from sour stomach; rheumatic pain, with acid urine and sour sweat, high fever and sour diarrhœa; acidosis.

Action and Therapy.—*External.* Powdered sodium bicarbonate, or preferably a strong solution gives quick relief from pain in superficial burns and scalds, soothes in dermatitis from Rhus Toxicodendron, and in pruritus due to acid urine. A weak solution injected sometimes relieves burning pain in gonorrhœa, and it is an ingredient of many lotions for acute and chronic catarrh, both nasal and vaginal. It softens hardened cerumen and may be used in the solution employed when syringing for its removal. A 10 per cent solution is a very efficient and unirritating agent to remove the crusts in ciliary blepharitis. Lotions of various strengths, as desired, may be used upon insect bites and in urticaria and erythema. It forms a good mouth wash where acids have been used, and sometimes relieves sore throat when used as a gargle. Used too freely and too often it may provoke an irritation of the throat, a common occurrence during the epidemics of influenza, when many by way of supposed prophylaxis unwisely created an irritation that did not previously exist. It provides one of the best of douches in acid leucorrhœa. Applied by means of hot compresses it frequently gives relief in acute articular rheumatism, in cases in which its internal use is also indicated.

Internal. The action of sodium bicarbonate is quite similar to that of sodium carbonate and potassium bicarbonate, but milder and pleasanter than either. It is an admirable antacid, but should not be used as such in infants on account of the painful distention of the stomach and bowels occasioned by the liberation of the carbonic acid gas. Magnesium oxide is preferable for children. For hyperchlorhydria in adults it is extremely useful Where specifically indicated relief is immediate, but as a rule not permanent. It should be given about two hours after meals. In acid dyspepsia it is palliative when there is cardialgia, sour eructations, flatulence and vomiting, or when there are sour diarrhœal discharges. In such conditions it serves a temporary purpose, easing pain and distress, and enabling the stomach to take appropriate subsequent treatment. Undoubtedly the liberated carbon dioxide assists in allaying pain by its carminative and obtunding effects. In stomach disorders it is frequently combined with bismuth subnitrate, or if atony is marked, with powdered ginger. It is also an ingredient of Seidlitz powder, a commonly used purgative in acid conditions of the stomach. When desired to increase the flow of gastric juice in achlorhydria, sodium bicarbonate may be given one half hour before meals. Even the frequent or continuous use of the salt for sour stomach will eventually increase the disorder and may establish an incurable dyspepsia. For sick headache due to overeating, or partaking of food which soon sours or becomes putrescent in the stomach, a half teaspoonful of soda and a third of a teaspoonful of common salt in a pint of barely warm water will either "settle the stomach" or act as an emetic, and promptly give relief. If desirable that emesis should take place, it is then easily provoked by tickling the fauces with the finger. We invariably advise this treatment in sour stomach with pain in so-called cases of acute indigestion. Intensely throbbing and bursting headache, due to similar cause, is relieved almost magically by the emetic action of "bicarbonate of soda and salt".

Sodium bicarbonate may be used to chemically antidote poisoning by

acids when spilled upon the person. If the acids are such as are destructive to tissues, it should not be given internally, if any other alkaline substances can be procured, on account of the danger of rupturing the stomach through liberation of carbonic acid gas.

Sodium bicarbonate is probably the best alkalizing agent in acidosis, or when it is threatened in diabetes. Its free use should be begun as soon as acetone is detected in the urine, even though diabetic coma is not yet established. As much as an ounce a day, well diluted, may be given. In diabetic coma, three or four ounces a day may be used, but the probabilities are that little benefit will come from any treatment. Such cases as have recovered have been given this salt in enormous doses; therefore, the presumption is that it may do good in an occasional instance.

When an alkalizing fluid is desired other than for diabetic states, and especially preceding grave surgical operations, the following pleasant drink may be used. It is a form popular in Christ Hospital, Cincinnati, under the name *Liberty Drink* (substituted for Imperial Drink). ℞ Potassium Bitartrate, grains 160; Sodium Citrate, grains 160; Sodium Bicarbonate, grains 320; Syrup (U. S. P.), ounces 8; Water, q. s., gallon 1/2. Sig.: *Dose*, a glassful (6 ounces), acidulated with lemon juice to taste.

The original "*Soda Water*"—the prototype of the popular fountain carbonated beverage and once a household drink, was prepared by adding bicarbonate of sodium dissolved in water, in one glass, to that of another holding a solution of vinegar, to which a little powdered ginger was added. The beverage was then drunk while it effervesced.

"*Imperial Drink*" is prepared by dissolving potassium bitartrate, ℥jss, in boiling water, Oij, and adding sugar and grated fresh lemon peel, aa ℥ss. This forms an alkalizing and refreshing beverage for fever patients.

The "A. B. C." mixture of hospitals is a solution in water, of 5 grains each, of acetate, bicarbonate, and citrate of potassium.

Sodium bicarbonate is diuretic and eliminative, therefore it has given marked relief in articular rheumatism, with acid and heavily loaded renal secretion, high fever, pallid membranes, and white coated tongue. It should be administered internally and applied locally. It is of much value in urinary disorders when the urine burns, and is especially grateful to relieve the ardor urinæ accompanying gonorrhœa. It should be largely diluted and drunk freely throughout the day. Sodium bicarbonate has given relief in biliary calculi, but is of no special value during an attack of hepatic colic.

When the indications as noted above are followed, sodium bicarbonate is an extremely useful remedy. When given indiscriminately and long continued without specific indications, it may do irreparable harm.

SODII BORAS.

Sodium Borate, Borax. (Formula: $Na_2B_4O_7+10H_2O$.)

Description.—Colorless, transparent crystals, or a white powder, devoid of odor and having a taste that is alkaline and slightly sweetish. It is very soluble in water and glycerin, but insoluble in alcohol. *Dose*, 1 to 30 grains.

Specific Indications.—Persistent sore mouth; uric acid diathesis; gravel; dyspepsia with sense of gastric constriction; gnawing pains, un-

easiness at stool, and urging to urinate, the discharge being finally muco-pus; acrid leucorrhœa. *Externally.* Aphthæ; vulvar pruritus with whitish deposits; leucorrhœa with glairy or colored discharge; freckles.

Action and Therapy.—*External.* Borax is antiseptic and detergent, and in solutions of various strengths is of great value as a wash for fetid and catarrhal surfaces. It is the most commonly used cleansing wash for leucorrhœa, acting best when the discharges are glairy, colored, and profuse. It enters into the composition of several preparations for nasal catarrh, and is the most useful salt for aphthæ in any part of the body and as a part of the treatment in thrush in infants. Borax and sugar are sometimes used upon the aphthous ulcers of the mouth, or it may be combined with honey, but as these saccharine bodies cause severe smarting the borax alone is preferable in young children. Locke advises, for older persons and those with phthisis, the following: ℞ Borax, ʒiij; Honey, fl ʒss; Infusion of Sage, Oj. Apply freely. It is one of the best applications to relieve vulvar pruritus, especially where there is sugar in the urine or when caused by acrid discharges. It sometimes removes freckles and other skin blemishes, and the deposits of pityriasis versicolor, and in the form of an ointment has checked falling of the hair. Scaly diseases of the skin are well-treated with borax, and it may be used to remove crusts in ciliary blepharitis, to cleanse the eye in conjunctivitis, and to remove hardened cerumen and fetid discharges from the ears.

Internal. Borax in large doses is poisonous, its effects being similar to those caused by Boric Acid, which see. Internally, in proper doses, it is diuretic, emmenagogue, and antiseptic. It has proved a useful agent in fetid dysentery and the summer diarrhœa of children, and is sometimes effective in acrid leucorrhœa attended by dragging pain in the back. The dose should be small. Without doubt it does some good occasionally in amenorrhœa, and in membranous dysmenorrhœa. It is also given for dyspepsia with constant uneasiness and gnawing in the stomach, and in bladder disorders with decomposition of urine and tendency to gravelly deposits. Its chief internal use is in fetid catarrhal diarrhœa and dysentery.

SODII BROMIDUM.

Sodium Bromide. (Formula: NaBr.)

Description.—White or colorless salt occurring as cubical crystals or a granular powder, without odor and having a salty taste. Freely soluble in water and alcohol. *Dose*, 1 to 60 grains.

Specific Indications.—Same as for *Potassii Bromidum*, which see.

Action and Therapy.—The action and uses of sodium bromide are practically the same as those of potassium bromide, except that its activity is not so great as that of the latter. Moreover, it is pleasanter to the taste, comparatively less sedative and hypnotic, and dose for dose, not so apt to induce mental dullness and lethargy. It is also thought to be less liable to cause acneiform eruptions, fetid breath, and other phases of bromism. This, however, is probably largely a matter of dosage. Where a powerful bromide impression is desired as in epilepsy, the potassic salt is to be preferred. But for women and children who are robust, but nervous and cannot rest or sleep, the sodium salt may be administered. It is especially

useful in plethoric individuals who are exhausted by mental and bodily fatigue, and for purely nervous palpitation of the heart, the result of masturbation or sexual excesses, alcohol and tobacco, especially the "cigarette habit." During the menopause it will prove useful and act more kindly than the corresponding salt of potassium, to control the nervous irritability. Like all bromides it should be given only in robust states, never in anemia and weakened conditions, and should be well diluted when administered.

SODII CACODYLAS.

Sodium Cacodylate, Sodium Dimethylarsenate. (Formula: $Na(CH_3)_2AsO_2$.)

Description.—Odorless, white, deliquescent, prismatic crystals, or a granular powder; very soluble in water and in alcohol. *Dose*, 1 to 4 grains.

Action and Therapy.—The uses of cacodylate of sodium are practically those of arsenic, and it should be given for like indications. It is best adapted when the slower arsenical effects are required as it very slowly breaks up in the body. Therefore, larger doses have been possible than with arsenic itself. An unpleasant feature of its action is gastric irritation, with strong garlic-odored eructations. It has been chiefly employed by mouth (1 to 4 grains), and hypodermatically (1/4 to 1/2 grain), in the anemia and debility of tuberculosis, in Hodgkin's disease, and by intramuscular injection (1 to 2 grains) to destroy the spirochæte of syphilis. The latter claim has not been sustained.

SODII CARBONAS MONOHYDRATUS.

Monohydrated Sodium Carbonate. (Formula: $Na_2CO_3+H_2O$.)

Description.—This salt is prepared by crystallizing ordinary sodium carbonate or sal soda, which contains ten molecules of water of crystallization, at a heat above 35°C (95°F). It is an odorless, white, granular, crystalline powder, with a powerful and typical alkaline taste. It slightly absorbs moisture in the air, and if dry and quite warm it effloresces and gradually becomes completely anhydrous. Very soluble in water, boiling water, or glycerin; insoluble in alcohol. *Dose*, 5 to 20 grains, well diluted.

Action and Therapy.—*External.* Sodium carbonate, either the common or the monohydrated varieties, is used in preparing alkaline baths. A weak solution is useful in pruritus vulvæ, and in various strengths it may be used in dry, scaly types of skin diseases, as psoriasis, lichen, pityriasis, ichthyosis and eruptive disorders of the scalp, with itching. Unless used in very weak dilution it is less valuable in vesicular or pustular eruption. Its chief value consists of a slight stimulating action, and the facility with which it destroys acid secretions and removes sebaceous matter and dirt.

Internal. Sodium carbonate is less used internally than formerly. It may, however, be employed as an antacid and diuretic. If used too long it may, through excessive alkalinity, induce the formation of urinary calculi; on the other hand, when largely diluted it is useful in the uric acid diathesis. It is less desirable than sodium bicarbonate, for the large amount of carbon dioxide contained in the latter helps to dissolve the phosphates and thus prevents the formation of phosphatic gravel. Small doses are sometimes useful in dry, scaly, skin diseases, when given conjointly with its external use. Owing to the relatively lesser amount of carbon dioxide evolved, it may be used in preference to sodium bicarbonate; in external

and internal poisoning by mineral acids it is one of the recognized antidotes.

Large doses of sodium carbonate, given for several days, have produced a condition of scorbutus. When this occurs or when excessive doses have been taken, vinegar, lemon juice, and other vegetable acids will antidote its action; oils also modify its destructive effects.

SODII CHLORIDUM

Sodium Chloride, Common Salt, Sea Salt, Table Salt. (Formula: NaCl.)

Description.—Transparent, colorless, cubical crystals, or a crystalline, white powder, without odor and having a purely saline or salty taste. It usually absorbs enough moisture when exposed to air to become slightly hygroscopic. Very soluble in water, soluble in glycerin, and slightly dissolved by alcohol. *Dose*, 5 grains to 1/2 ounce.

Preparation.—*Liquor Sodii Chloridi Physiologicus*, Physiological Solution of Sodium Chloride (Physiological Salt Solution, Normal Salt Solution). A solution prepared under sterile precautions and not to be used after forty-eight hours old. It contains 8 1/2 parts of salt in 1,000 parts of solution.

Specific Indications.—Tongue broad and pale, with white coat or fur; broad tongue of natural color, but easily pitted by the teeth; poisoning by silver salts.

Action.—The action of sodium salts is much like that of the corresponding potassium group, with perhaps a less depressing influence upon the nervous system, the muscles, and the heart. See also Salt Action at end of this article.

Therapy.—*External.* The application of hot salt bags is a favorite method of applying heat to allay local pain, as in neuralgia, headache, toothache, earache, colic, and dysmenorrhœa. Saturated compresses of solutions of salt are applied like poultices, and are much cleaner, in visceral inflammations. In arthritis, whether traumatic, rheumatic, or tubercular, they may be applied hot or cold, as desired. Hot solutions with alcohol (whiskey) added, are commonly employed in contusions, sprains, and glandular inflammations. Rarely, weak solutions are used in ophthalmias and in trachoma. Weak solutions, alone or in combination with alkalies and disinfectants, are useful in acute and chronic nasal catarrh, ozæna, pharyngitis, and tonsillitis; while strong, hot solutions are valuable as douches in leucorrhœa with much relaxation of the tissues, and in pruritus vulvæ, and by means of compresses to bites and stings. A salt-water enema, made weak, is the most effectual agent against the thread worm. If used too strong it irritates the rectum and causes much pain.

Internal. Sodium chloride in doses of two to four drachms will purge, and sometimes vomit. Still larger doses will vomit without causing prostration. In excessive amounts for a continued time salt gives rise to hoarseness, sore throat, either constipation or diarrhœa, catarrh, thinning of the blood, waxy complexion, and probably permanently damages the kidneys. In small doses it is a condiment, food, alterative, and vermifuge. It is useful in chronic diseases with a pale tongue coated with a white fur. Salt given in sufficient quantity for the needs of the body favors the bettering of conditions in which worms become established and thrive. It is especially beneficial where the food decomposes, giving rise to gastralgia, acidity, flatulence, and constipation or diarrhœa.

Mustard and salt forms a good emetic in acute narcotic poisoning; soda and salt a good corrective for acid conditions of the stomach, with violent sick headache, due to overloading the stomach. With plenty of warm water and titilation of the fauces, vomiting may be readily induced and the stomach thus washed out. A pinch of salt should be occasionally given to patients with fever and other conditions in which little nourishment can be taken. This may mean "the difference between life and death"; and small quantities should be added to the food of bottle-fed infants suffering from infantile dyspepsia or cholera infantum.

A teaspoonful or less of dry salt slowly dissolved in the mouth may assist in controlling hæmoptysis. While the salt may have some astringent properties, there is no doubt that the quiet induced by demanding of the patient slow swallowing, together with the psychologic effect of the treatment, has much to do with its success. A solution of common salt is the antidote to poisoning by silver nitrate and other silver salts. Such a solution should always be previously prepared when about to apply a silver salt, and thus be at hand to limit the action of the latter.

Salt, through its so-called "salt action", possesses remarkable osmotic properties. Strong solutions draw fluid from cutaneous and mucous surfaces, and this exchange with salt is liable to produce more or less irritation; the red blood-discs are similarly affected and shrink in and become crenated. Dilute solutions on the other hand cause softening and swelling instead of hardening and shrinking. When weaker than the plasma of the blood salt solutions are said to be *hypotonic;* when more strongly concentrated *hypertonic;* when of equal concentration as plasma, and therefore exerting the same osmotic balance, they are said to be *isotonic*, normal or physiologic solutions. The latter state has been taken advantage of for using salt solutions to replenish lost blood and secretions, after operations and accidents and in diseases characterized by excessive drain upon the blood-plasma. Used by hypodermoclysis or enteroclysis it is considered the best and most reliable means of combatting shock from loss of blood, and in violent serous diarrhœa and Asiastic cholera. Sometimes in the latter disorder it has been used intravenously, adding to it some other alkali, as calcium chloride or sodium sulphate or carbonate. This method, however, is not wholly free from danger.

Normal salt solution provokes an enormous passage of urine when used by intestinal lavage, and for such a diuretic purpose it has been useful in pneumonia, empyema and other diseases and auto-infections, and in acute nephritis. It should not, however, be used in chronic forms of nephritis with œdema. It is extremely useful in chronic colitis by washing away mucous detritus and allowing other applications to come into contact with the mucosa; a similar use may be made of it in cholera infantum and acute dysentery and typhoid fever. Used in this way it prevents the reabsorption of the putrid and toxic products which tend to prolong these disorders.

The dose of salt as an alterative is from two to thirty grains; as an enema, one-half to one ounce to one quart of water; as a cathartic, two to four drachms; as an emetic, one-half to one ounce.

CHLORINE YIELDING PREPARATIONS.

Chloramines.—During the World War the Dakin-Carrel treatment of wounds came into prominence, being conspicuously notable for good results with the minimum of lymphatic involvement. This consisted in the employment of a specially prepared sodium hypochlorite (NaO Cl) solution, for continuous disinfection. Dakin assumes, that when chlorine compounds come into contact with organic matter, as when used as a disinfectant, that the released free chlorine forms, among other bodies, substances called *chloramines*. The latter, it is contended, and not the oxygen liberated, as was once thought to be the case, are the active antiseptic agents. This treatment and the solutions originated with Drs. Alexis Carrel and H. D. Dakin and their colleagues.

Owing to the complicated technic of preparing the Dakin-Carrel and similar solutions several commercial forms of chloramines are now available and much better adapted for use by the general practitioner.

Notable among these disinfectants is Dichloramine-T. Chemically it is toluene-para-sulphondichloramine. By using it in 7 1/2 per cent solution in chlorinated petrolatum, or in chlorinated eucalyptol (chlorinated so as not to absorb the chlorine of the antiseptic), a non-irritant, slow action is obtained by which the antiseptic gradually is liberated, the time consumed usually being from 18 to 24 hours. Dakin's solution, as well as Dichloramine-T, dissolves blood clots, dead tissue, etc., hence it is advised that vessels be ligated to prevent or stop hemorrhage when using these antiseptics.

Chief among the prepared compounds are *Chloramine-T* and *Chlorazene* (both water soluble), and *Dichloramine-T* (oil soluble); and as a solvent for the latter, a chlorinated paraffin, *Clorcosane*.

All of the Chloramine preparations are for external use only—they should not be taken internally.

Chloramine-T (Sodium para-toluene-sulphon-chloramine—$CH_3.C_6H_4SO_2NaNCl.3H_2O$). A water-soluble, white powder, of a slight chlorinous odor, and insoluble in oils. Used as a germicide and disinfectant for wounds, acting like hypochlorites but with less irritation. Solutions of 1 to 2 per cent strength are generally employed; for use in the nose and throat 1/4 per cent solutions.

Chlorazene is a brand of water-soluble Chloramine-T similar to the preceding. It is marketed in tablets containing 4.6 grains. When a solution is desired quickly the tablet should be crushed with a silver spoon or glass rod and then dissolved in water.

Chloramine-T Paste.—A 1 per cent white and odorless "vanishing cream" paste. The base is neutral sodium stearate.

Dichloramine-T (Toluene-para-sulphondichloramine—$CH_3.C_6H_4.SO_2NCl_2$) is a white powder of chlorinous odor, and insoluble in water. Soluble in chlorcosane (about 10), in chlorinated eucalyptol, or in chloroform. For use in oily solution as a germicide and disinfectant upon wounds (2 to 5 per cent solutions), nose and throat (1 per cent), and eyes (1/2 to 1 per cent). Prepare by stirring into warm chlorcosane, and cooling to desired temperature for use. It should be freshly prepared as a rule, but if kept the solution should be discarded if a precipitate not soluble upon gentle warming is present.

Chlorcosane.—A chlorinated paraffin or oil solvent for Dichloramine-T, capable of holding in solution from 8 to 10 per cent of the latter. It is a yellow, tasteless, bland and stable oil, non-irritant and non-toxic. Solutions of from 2 to 5 per cent strength are used upon wounds, and 1 per cent or weaker in nose and throat work, applied by means of a swab or atomizer. If chlorcosane solutions of Dichloramine-T develop a precipitate that fails to disappear upon gently warming them, they should be discarded. Preferably they should be freshly prepared.

Halazone (Para-sulphondichloraminobenzoic acid). A stable, powerful disinfectant for the sterilization of drinking water. It has an action similar to that of chlorine. It contains, besides the halazone, anhydrous sodium carbonate and sodium chloride to facilitate solution. A 1/16 grain tablet is sufficient to sterilize one quart of water, the latter so treated being allowed to stand for an hour. It was introduced by Drs. H. D. Dakin and E. K. Dunham.

SODII CITRAS.

Sodium Citrate. (Formula: $2Na_3C_6H_5O_7+2H_2O$.)

Description.—An odorless, white, granular powder, or small crystals, having a cooling, saline taste. Very soluble in water; insoluble in alcohol. *Dose*, 5 to 30 grains.

Specific Indications.—Faulty nutrition in bottle-fed infants, who vomit heavy curds of milk; wasting and marasmic states of artificially fed infants; acid urine in the aged with cystic irritation.

Action and Therapy.—Sodium citrate is easily soluble in both water and milk, and is perfectly innocuous, being given in some cases in daily quantities of an ounce or more. Small doses, however, should be given to children. Two or three grains may be added to each ounce of milk fed to young babies. It has the great advantage of preventing the formation of large curds of milk, that by their toughness readily give rise to stomach and bowel troubles in infants. It is particularly indicated in children who are wasting away on account of faulty digestion, and in the marasmic little ones little benefited by other medication. Another condition which may be present in children, but that is more common in the old, is an acid state of the urine, giving rise to great irritation of the bladder and outlets. More especially is it recommended if there be present the colon bacillus. A full teaspoonful should be given in a full glass of water to adults, and smaller quantities to children, two to four times a day. Its alkalizing effect is powerful, it probably being converted in the system into sodium carbonate. See also "Liberty Drink" under *Sodii Bicarbonas*. The degree of correction of acidity may be determined by litmus paper. Sodium citrate has also been used successfully in acetonuria, in the vomiting of pregnancy, and in the cyclic vomiting of children. Its ease of administration and harmlessness are strong recommendations for the further study of this drug, especially in the malnutrition of children. It does not act as a cathartic, nor does it nauseate, but, on the contrary, is quick to relieve gastric distress.

SODII HYPOPHOSPHIS

Sodium Hypophosphite. (Formula: $NaPH_2O_2.H_2O$.)

Description.—Small, colorless and odorless, pearly, lustrous crystals, or a granular, white powder, of a bitterish-sweet, saline taste. Upon exposure to moist air it quickly deliquesces. Very soluble in water, and less readily in alcohol. *Dose*, 2 to 25 grains.

Specific Indication.—Malnutrition of the nerve centers with nervous depression.

Action and Therapy.—Sodium hypophosphite is used in malnutrition of the nerve centers in which it opposes nervous depression. It is also useful in coughs accompanying chronic lung diseases, as bronchitis, and in malnutrition of the osseous tissues, with anemia. When indicated it improves the nutrition of the body, renders expectoration less but freer, and favors nerve rest. It is not curative in consumption, for which it was introduced by Churchill, but is a useful adjunct in the treatment of that disease to increase strength, allay cough, and modify secretion. It should be given preferably after meals, well diluted, or if agreeable, in syrup.

SODII IODIDUM.

Sodium Iodide. (Formula: NaI.)

Description.—Colorless, cubical crystals, or a crystalline, white powder devoid of odor and having a saline, peculiar taste, suggestive of slight bitterness. In moist air it deliquesces, liberating iodine, which imparts to it a reddish color. Freely soluble in water, alcohol, and glycerin. *Dose*, 1 to 10 grains.

Action and Therapy.—Sodium iodide is preferred by some over iodide of potassium, upon the belief that it is less liable to produce gastro-intestinal, coryzal, and skin disturbances. It is a weaker salt than the latter,

and is used in syphilis and eczema when the iodides are demanded but the system is greatly depressed.

SODII NITRAS.

Sodium Nitrate, Chili Saltpetre, Cubic Nitre. (Formula: $NaNO_3$.)

Description.—Odorless and colorless, transparent, cubical crystals, having a saline, cooling, and feebly bitter taste; deliquescent in moist air; freely soluble in water and in about 100 parts of alcohol. *Dose*, 1 to 30 grains, largely diluted.

Action and Therapy.—In full doses this drug resembles in action nitrate of potassium. It is mildly purgative and diuretic, contributing greatly toward increasing the output of urea. The indications for it, as elaborated by Scudder, are practically the general guides for alkalies: "A swollen and puffed tongue, covered with whitish or yellowish mucus; the mouth may be dry or moist, but the tongue must never show contraction, be elongated or pointed, or deep red". Also, "when the pulse is full, the surface flushed, slightly dusky or purplish; eyes injected, though not dry; an increased perspiration though the skin remains hot". These are the conditions under which it is said to be useful in acute diseases, though it is now rarely administered.

SODII NITRIS.

Sodium Nitrite. (Formula: $NaNO_2$.)

Description.—This salt occurs in three forms: as fused, white, or nearly white opaque masses or pencils; or as colorless, transparent crystals, or a granular powder, without odor but having a mildly saline taste. It is very soluble in water; sparingly in alcohol. *Dose*, 1/2 to 2 grains.

Action and Therapy.—The action of sodium nitrite resembles that of amyl nitrite and nitroglycerin, except that it is less pronounced and more prolonged, probably on account of its slower absorption and elimination. While its action is more uniform when it does act, it is less certain than nitroglycerin to accomplish the purposes for which it is prescribed—chiefly that of lowering arterial tension. It may be used in angina pectoris, but nitroglycerin is more prompt. But when a prolonged effect is desired sodium nitrite may be preferred, as it is also in Raynaud's disease, to relieve the spastic contraction by dilating the digital arteries. It is also of service in headache from cerebral anemia, convulsions with high blood-pressure, granular disease of the kidneys, with arteriosclerosis, and in heart disorders with degeneration of the cardiac muscles. The general indications are dyspnœa, frontal headache, or dizziness. The single dose is usually one grain; it should never exceed two grains.

SODII PHENOLSULPHONAS.

Sodium Phenolsulphonate, Sodium Sulphocarbolate. (Formula: $NaC_6H_5OSO_3 + 2H_2O$.)

Description.—Transparent, colorless crystals or crystalline granules, without odor and to the taste cooling, disagreeably saline and bitter. Very soluble in water or glycerin, and less so in alcohol. *Dose*, 1 to 8 grains.

Action and Therapy.—Sodium phenolsulphonate is a disinfectant and owes its properties chiefly to the phenol present. It destroys thrush, and may be of value in fermentative dyspepsia and diarrhœa. It is not so much valued, as formerly, in infectious diseases.

SODII PHOSPHAS.

Sodium Phosphate, Sodium Orthophosphate. (Formula: $Na_2HPO_4+12H_2O$.)

Description.—Sodium Phosphate occurs in large, colorless and odorless crystals, or a granular salt, of a cooling, saline taste, and gradually efflorescent in the air. It should be kept in well-stoppered bottles, in a cool situation. It is soluble in water and hot water, and insoluble in alcohol. *Dose*, as a restorative, 1 to 10 grains every three or four hours; as a laxative, 10 to 60 grains; as a cathartic, 6 to 10 drachms. Usual dose, 60 grains.

Preparations.—1. *Sodii Phosphas Exsiccatus*, Exsiccated Sodium Phosphate. Sodium Phosphate deprived of its water of crystallization. A white granular powder. *Dose*, 1 to 60 grains.

2. *Sodii Phosphas Effervescens*, Effervescent Sodium Phosphate. A granular powder containing 20 per cent of Exsiccated Sodium Phosphate admixed with Citric and Tartaric Acids and Sodium Bicarbonate. This preparation is usually dispensed in original bottles, and should not be given out in paper or boxes, as it readily deteriorates and loses its effervescing quality. *Dose*, 150 grains.

3. *Specific Medicine Sodium Phosphate.* A fine, white, granular powder. About double the strength of Sodium Phosphate and largely preferred by Eclectic practitioners. *Dose*, 1 to 60 grains.

Specific Indications.—Deficient biliary secretion, with pale, expressionless membranes, general malaise and inanition; tongue dirty and moist, with golden yellow coat, or a dry fur upon a pallid tongue; sallow skin, with bilious headache; jaundice; acid eructations; diarrhœa of infants with green and white passages, with impaired nutrition, or hard, whitish, pasty or spongy stools which float upon water; infantile constipation with malnutrition; habitual constipation of adults, with hard, dry feces, and deficient biliary activity.

Action.—Sodium phosphate is laxative and cathartic, according to the quantity administered. It probably has also a cholagogue effect. If given on an empty stomach, preferably before breakfast, in a liberal amount of hot or cold water, a laxative dose produces a full and comparatively painless evacuation of the bowels, being effective usually in about six hours. Larger doses have a tendency to gripe. The salt may be taken for months with less harm than almost any other saline laxative. Being slightly alkaline it corrects gastric acidity and lessens the tendency to flatulence. In small doses (1 to 10 grains) it acts as a reconstructive, and as such has been advocated in various conditions of malnutrition, with evident impairment of the nervous system and predisposition to rachitis and caries.

Therapy.—In laxative doses, sodium phosphate is especially effective in chronic constipation, due to hepatic and intestinal torpor. It is also valuable in diarrhœa, depending upon biliary inefficiency. By its cleansing action upon the duodenum, through stimulation of the intestinal glands, it favors a freer flow of bile and lessens the tendency to inflammation of the gall-bladder (cholecystitis) and the formation of gall-stones. It is also a satisfactory laxative for catarrhal jaundice, dependent upon the presence of hepatic calculi or of catarrh of the duodenum. It is of great advantage in the bowel disorders of bottle-fed children. There may be either diarrhœa or constipation. The stools are foul-smelling and variously fluid and white, or green and white (curds and greens), or are voided in solid, chalky or pasty whitish, putty-like evacuations, evidently lacking in bile, and so light that they easily float upon water. There is also more or less colicky pain, the child is fretful and dull, and may betray muscular soreness upon being handled. The latter is especially true when general malnutrition

is present. Conditions like these frequently are the forerunners of rickets and osseous decay, and some have thought to furnish phosphorus to the brain tissues and to the bones by the administration of this salt. It is a debatable question, however, as to whether the human system is able to produce the physiological union desired for this purpose. It should be given a fair trial in infantile dyspepsia, with capricious appetite and alternate diarrhœa and constipation. Clinical experience seems to justify the use of sodium phosphate in cases of malnutrition, malaise and nervous degeneracy, and it has been administered successfully in trigeminal neuralgia, neurasthenia, and in locomotor ataxia. The use of the drug, by the hypodermatic method (sodium phosphate, 1 part; alcohol, 2 parts, and distilled water, 60 parts) in daily doses of fifteen minims, gradually increasing to forty-five minims, it is to be remembered, is still in the experimental stage and awaits further confirmation before it can be commended. Finally, it has been advocated in lithemia, and, administered early and persistently, appears to act advantageously in hepatic cirrhosis.

SODII SALICYLAS.

Sodium Salicylate, Salicylate of Soda. (Formula: $NaC_7H_5O_3$.)

Description.—Variously a micro-crystalline powder, scales, or a non-crystalline powder, without color or but faintly pink; odorless, and to the taste saline or soda-like, sweet and somewhat disagreeable. Very soluble in water or alcohol, and also dissolved by glycerin. *Dose*, 5 to 30 grains.

Specific Indications.— Antirheumatic when the tongue is full, purplish, or leaden colored, showing spots where the fur is lifted; fever, not especially high, and the affected parts red, with some purplish discoloration, particularly when pressed upon (Scudder); fermentative stomach and bowel disorders.

Action and Therapy.—*External.* A strong solution of sodium salicylate (about ℥ij to Oj) is an excellent application for poisoning by ivy and noxious weeds, and it provides a good lotion for erysipelas. It should not, however, be used upon the skin if iron preparations have been previously employed, lest it stain the tissues a deep purple. A solution of the salicylate has been used locally as an adjuvant to treatment by the internal exhibition of the salt, or where the stomach will not tolerate the sodium compound.

Internal (See also *Acidum Salicylicum*). The internal action of sodium salicylate is practically the same as that of salicylic acid after absorption. On account of the lesser solubility of the acid, and its more irritant effects upon the gastric mucosa, the use of the sodium salt has largely superseded that of the equally effective acid. Both salicylate of sodium and the acid, from which it is prepared, hold the indisputable rank of being the most effective and most generally indicated drugs in acute rheumatic infection. For its use in acute articular rheumatism and subacute or muscular rheumatism and the train of disorders dependent upon infection by the *micrococcus rheumaticus*, see *Acidum Salicylicum* (page 137). Besides the uses mentioned therein it is distinctly valuable in rheumatic pharyngitis, rheumatic ophthalmia, rheumatic iritis, and in rheumatic displacement of the retina, in the latter especially, to check further detachment and to relieve distressing symptoms. It is sometimes efficient to alleviate the pain

in dysmenorrhœa in rheumatic women. The indications as given on page 646 represent the chief conditions in which it may be used, though it appears to fit true rheumatic infection regardless of the condition of the tongue and other guides there noted.

Salicylate of sodium increases the flow of bile and assists in the elimination of uric acid and the urates. In duodenal irritation and subacute inflammation which sometimes precede cholecystitis, this salt may be given both for its sedative and antiseptic effect. It also relieves in the milder forms of biliary colic when associated with inflammation of the gall-bladder and duodenal catarrh and dependent more upon the inflammation than the actual presence and passage of gall-stones.

In acute colds and coryza of a pronouncedly grippal type, and in those of septic influenza, and in the frontal headache of epidemic influenza, it is a remedy of first importance. Chilliness, sneezing, malaise, nervous and muscular depression, and a sense of fullness in the frontal sinuses are direct indications for it. It is a logical remedy in frontal catarrhal sinusitis, and often relieves supra-orbital neuralgia of rheumatic origin. In pleurisy due to a rheumatic cachexia it should be given in alternation with aconite and bryonia. Its value in acute tonsillitis of all types, and particularly the rheumatic, is beyond dispute. Ellingwood praises sodium salicylate in whooping cough, giving two or three grains, three times a day, and in larger doses, fifteen grains, three times a day, for nervous cutaneous pruritus.

SODII SULPHAS.

Sodium Sulphate, Glauber's Salt. (Formula: $Na_2SO_4+10H_2O$.)

Description.—Large, transparent and colorless, prismatic crystals, or granular crystals, without odor and having a saline, bitter taste. It rapidy effloresces when exposed to the air. Very easily dissolved by water; insoluble in alcohol but soluble in glycerin. *Dose*, 1 grain to ʒss.

Preparation.—*White Liquid Physic* (Sodium Sulphate, lb. ss; Water, Ojss; Nitric Acid, Hydrochloric Acid, aa fl ʒj). *Dose*, 1 to 4 fluidrachms.

Specific Indications.—Tissues pale, full and sodden; full, pallid tongue, easily pitted by the teeth; watery, greenish diarrhœa (3 x trit.); hepatic fullness and tenderness; biliousness. Large doses in dysentery, lead poisoning, and poisoning by phenol (carbolic acid).

Action and Therapy.—Glauber's salt is a mild but cooling laxative or purgative according to the dose administered; operating somewhat like magnesium sulphate. It is equally as efficient as the latter, but is less popular on account of its disagreeable taste. As an ingredient of the "White Liquid Physic" it is a good purgative in acute dysentery. It is also of service in lead colic, and may be used freely in poisoning by phenol, for which it is said to be an antidote. It is still a debatable question, however, as to whether it really does antidote phenol poisoning, but no mistake will be made in administering it, for it is harmless and will at least act as a purge. The majority of clinicians are satisfied that it does exert a destructive action upon the phenol. In chronic lead poisoning it will be tolerated by the stomach longer than will iodide of potassium. A favorite domestic laxative for chronic constipation is prepared by adding one pound of Glauber's salt and one ounce of essence of peppermint to one

quart of water. Of this a tablespoonful is taken once or twice a day. The taste of the salt is somewhat modified by lemonade, or sweetened carbonated water.

Aside from its cathartic action, sulphate of sodium has a specific effect in stimulating "retrograde metamorphosis" and excretion. It is indicated when the tissues are pale, full and sodden, the tongue pallid, full, and easily pitted by the teeth. From ten to twenty grains may be given in a pint of water. It has been advised in small doses to prevent the formation of biliary calculi. Webster advises the 3 x trituration in the green diarrhœa of teething, cholera infantum, and ileocolitis in children. Two-grain doses every hour, by mouth or intravenously, are said to control capillary hemorrhages even of grave import.

SODII SULPHIS EXSICCATUS.

Exsiccated Sodium Sulphite. (Formula: Na_2SO_3.)

Description.—An odorless, white powder, having a cooling, saline taste suggestive of burning sulphur; soluble in water, sparingly in alcohol. If exposed to air sodium sulphite is slowly oxidized to sodium sulphate.

Preparation.—*Specific Medicine Sodium Sulphite. Dose,* 2 to 60 grains.

Specific Indications.—Broad, pallid tongue, with white or dirty-white coat, and pallid mucous membranes; fetor; fermentation and putrefaction; (locally) parasitic skin diseases.

Action and Therapy.—*External.* Sodium sulphite in saturated solution is an efficient agent in many parasitic diseases of the skin, as ringworm, pityriasis versicolor, and scabies, though it is less effectual than sulphur itself in the latter disorder. It will remove the stains of iodine.

Internal. Sulphites are poisonous in very large doses, but the rapid change they undergo in being converted into sulphates results in frequent rapid recovery from very deep poisoning (Wood). They belong to the oldest class of disinfectants and are largely used to control or prevent fermentation and putrefaction. This is undoubtedly due to the liberation of the sulphurous acid radical, the principle upon which the remedial properties of all the sulphites depend. Besides this, in the case of sodium sulphite, there is the alkaline element present to overcome excessive acidity.

Sulphite of sodium has been one of the most important specific medicines since the introduction of specific therapy, and the prompt response to the action of the remedy has done as much as any one agent to insure a belief in the value of that form of practice. When any diseased condition is present, immaterial as to name, it will ameliorate or cure when a cure is possible, or prepare the field for the easy operation of other medicines, when the classic indications are observed, viz.: the broad, pallid tongue, with white or dirty-white coating, and extremely fetid breath, though the latter is not always present. Special disorders in which it will frequently be needed are the prefebrile stage of fevers, or during the course of typhoid, or other fevers, in erysipelas, tonsillitis, and other forms of sore throat, and fermentative and putrefactive dyspepsia and other forms of stomach and bowels disorders. Successful medication often depends upon the correction of the very conditions upon which sulphite of sodium acts favorably, for when the putrefactive and dirty condition is removed then other medicines can be absorbed and exert their fullest effects.

SODII THIOSULPHAS.

Sodium Thiosulphate, Sodium Hyposulphite (incorrectly). (Formula: $Na_2S_2O_3+5H_2O$.)

Description.—Colorless and transparent, prismatic crystals, devoid of odor, but having a cooling and subsequently bitter taste. *Dose*, 5 to 30 grains.

Specific Indications.—Fermentative dyspepsia, with yeasty vomiting; pallid mucous membranes, with pasty white, or dirty white exudate upon the tongue.

Action and Therapy.—*External.* Sodium thiosulphate will remove the stains of iodine. A solution or an ointment (℥j to water or lard, ℥j) forms a good parasiticide and has been used in pityriasis versicolor, favus, and sycosis, being especially useful in the first named disorder. It has also been found of much service in impetigo and in pruritus vulvæ.

Internal. The use of this salt internally has largely been supplanted by sodium sulphite. It destroys fungous and low forms of vegetation, hence it has been used to prevent or arrest fermentative and putrescent changes within or without the body; moreover, it is a good deodorant for putrid discharges. It has been very successfully used internally (and externally) in cancer for its deodorizing effects, and both internally and by atomization for fetid bronchitis and pulmonary gangrene. The drug is one of the best for water brash with frothy eructations, and containing sarcinæ ventriculi, and if given before acidity of the stomach has developed it will check fermentative changes in the stomach and bowels. In order to be effective, any acidity of the stomach must first be corrected.

SOLANUM.

The root and fruit of *Solanum Carolinense*, Linné (Nat. Ord. Solanaceæ). Waste places and fields in eastern half of the United States. *Dose*, 10 to 30 grains.

Common Names: Horse-Nettle, Bull-Nettle, Sand Brier, Treadsoft.

Principal Constituents.—Solanine, solanidine, solanic acid, and solnine, a crystallizable alkaloid isolated by John Uri Lloyd, and physically resembling hydrastine.

Preparation.—*Specific Medicine Solanum. Dose*, 10 to 30 drops.

Specific Indications.—Epileptiform convulsions of iodiopathic origin; hystero-epilesy; spasmodic cough.

Action and Therapy.—Solanum is antispasmodic, and for this effect has been extolled as a remedy for iodiopathic epilepsy, in which extraordinary claims are made for it; and of lesser value, in petit mal. As large doses are required its effects may border upon the poisonous. Hare asserts that he has reduced the force and frequency of epileptic attacks with it; and most observers claim that it acts best when the attacks are severest at or when provoked by or occurring in the menstrual period. It has been used also in chorea, but not with marked benefit. We have found it a good modifier of the paroxysms of whooping cough. Altogether its virtues are much overrated.

SPARTEINÆ SULPHAS.

Sparteine Sulphate. (Formula: $C_{15}H_{26}N_2.H_2SO_4+5H_2O$.)

The sulphate of the liquid alkaloid sparteine derived from *Cytisus Scoparius* (Linné), Fink (Nat. Ord. Leguminoseæ).

Description.—Hygroscopic, colorless crystals or a crystalline powder, without odor and having a feebly saline, bitterish taste. Very soluble in water and alcohol; insoluble in ether and chloroform. *Dose*, 1/20 to 1/2 grain; great variation of dosage prevails, but not more than 1/6 grain should be given for a beginning dose.

Specific Indications.—Functional cardiac disorders with feeble heart action; tumultuous palpitation of the heart; weak, irregular heart action; dropsy of cardiac origin.

Action and Toxicology.—Sparteine, and scoparius from which it is derived, are employed to regulate weak heart action and induce diuresis, both of which effects they sometimes fail to accomplish. Most observers believe the diuretic virtues per se, if any, reside in the scorparin and not in the sparteine, and that if the latter causes any diuretic effect it is due to its property of increasing the heart's power and raising blood pressure in the renal organs. Scoparin has not been well investigated. Small doses of sparteine stimulate the heart and strengthen its ventricular contraction, and accelerate the pulse and raise arterial tension. Poisonous doses depress these functions. Small amounts also have no effect upon respiration, but toxic doses paralyze the respiratory centers. Sparteine probably does not impress the renal cells. The greatest force of sparteine is spent upon the nervous system, where large doses exert a profound depressing effect upon the brain and the motor tracts of the cord, decreasing and finally paralyzing the powers of motion and reflex activity. Less profound is its action upon man than upon animals, but the following toxic symptoms have been noted in the human being: dizziness, nausea, trembling and heaviness of the limbs, muscular incoördination, irregular heart action, and convulsions, both clonic and tonic, superseded by a secondary stage of nervous depression and general debility.

Therapy.—Sparteine sulphate acts quickly, in from one half to three quarters of an hour, reaching the maximum of its power in from five to six hours, and its effects are sometimes prolonged for nearly a week. It is employed chiefly in cardiac diseases with dropsy to increase the action of the heart and arteries, and to regulate arrythmical movements of the former. It spurs the heart to increased action when abnormally slow as from exhaustion (Seé) and gradually slows it to normal when pulsations are unduly rapid (Clarke). Sparteine may be given in cases in which digitalis is apparently indicated, but cannot be used on account of causing stomachic irritation or of idiosyncrasy of the patient. It is regarded as free from cumulative effects. Though probably less generally valuable than digitalis, it may be used in heart diseases, especially where there is lack of compensation. The affections in which it has been praised are: "irregular heart action from valvular lesions, or debility of the cardiac muscle; slow heart action due to functional exhaustion; obstructive heart disease with palpitation, and tumultuous heart action; functional palpitation (prompt results); mitral regurgitation, and aortic regurgitation with irritable and enlarged heart. In mitral stenosis its effects are less beneficial, but in exophthalmic goitre its action is said to be pronounced" (*American Dispensatory*). Only the fractional doses (1/20 to 1/10 grain) should be used in obstructive heart disease, as larger doses (1 to 2 grains) are apt to induce unpleasant symptoms, chief among which are præcordial tightness and pain. Rarely sparteine sulphate relieves cardiac asthma. In dropsy wholly dependent upon heart weakness it sometimes succeeds admirably, but it is inferior, by far, to infusion of scoparius. Neither will it nor scoparius have the least effect upon dropsies of renal or other origin. From one to two grains,

hypodermatically, have been advised in post-operative suppression of the urine (anuria), presumably with low blood pressure; and Potts has advised it in doses of one-half to two grains, three times a day, to control tremor in paralysis agitans (Parkinson's disease). Great diversity of opinion concerning dosage has been expressed by heart clinicians, from 1/64 to 1/16 grain up to 1/2 to 12 grains having been advised. The beginning dose should not exceed 1/6 grain, to be increased as circumstances warrant. Remembering its power when a good alkaloidal salt is used and its prolonged action, one must exercise great caution in sparteine medication.

SPIGELIA.

The dried rhizome and roots of *Spigelia marilandica*, Linné (Nat. Ord. Loganiaceæ). Southern United States; less plentiful in northern parts of eastern half of the Northern States. *Dose*, 1 to 2 drachms for adults; less for children.

Common Names: Pinkroot, Maryland Pink, Carolina Pink, Worm-grass.

Principal Constituents.—A volatile alkaloid, *spigeline* (resembling coniine and nicotine), volatile oil, resin, and a bitter body.

Preparations.—1. *Specific Medicine Spigelia. Dose*, 5 to 60 drops (full dose as anthelmintic).

2. *Fluidextractum Spigeliæ et Sennæ*, Fluidextract of Spigelia and Senna. *Dose*, 30 to 60 drops.

Specific Indication.—Lumbricoids.

Action and Toxicology.—In large doses spigelia is toxic, causing increased cardiac action, cerebral disturbances, as dizziness, dimness of vision, dilated pupils, facial and palpebral spasms, general convulsions and stupor. Purgation often results from such quantities. Catharsis minimizes the danger of unpleasant symptoms, therefore it is usually administered with a cathartic, as senna.

Therapy.—Pink root is an active and very certain vermifuge, removing the round or lumbricoid intestinal worm. The powdered root (5 to 20 grains for a young child; 1 to 2 drachms for an adult) or the fluidextract, or specific medicine in equivalent dosage may be given twice a day, together with or followed by an active purgative. Senna is usually preferred. Ellingwood advises ℞ Fluidextract of Spigelia, fl℥ij; Santonin (powdered), gr. xv; Simple Elixir, q. s., fl℥ij. Mix. Sig.: One teaspoonful every night and morning, followed on the third day by a non-irritating laxative. Many who are old enough will recall the days of domestic medication when pink and senna (popularly pronounced seeny) tea was a regular feature of child raising.

Interest has been attracted to spigelia, chiefly of homœopathic origin, as a remedy in heart affections, particularly endocarditis of rheumatic origin and to guard against relapses of cardiac rheumatism. Cardiac neuralgia with palpitation and pain extending along the arm is also said to be relieved by it. For these purposes the fractional dose is to be preferred. ℞ Specific Medicine Spigelia, gtt. x to xv; Water, fl℥iv. Mix. Sig.: One teaspoonful every two hours. Large doses are said to debilitate the heart.

SPIRITUS ÆTHERIS NITROSI.

Spirit of Nitrous Ether, Sweet Spirit of Nitre (Niter).
An alcoholic solution of Ethyl Nitrite ($C_2H_5NO_2$).

Description.—A mobile, volatile and inflammable, clear liquid of a pale-yellow or faintly greenish-yellow tint, having a pungent ethereal, fragrant and non-acrid odor, and a sharp, hot taste. It readily changes when carelessly kept, losing its active constituent —the ethyl nitrite—and is then of no value for the purposes intended. It should be discarded if it reddens blue litmus paper (free acid) or effervesces with potassium or sodium bicarbonate. *Dose*, 1 drop to 1 fluidrachm.

Specific Indications.—Increased temperature with frequent pulse, dry skin, renal inactivity and nervous irritability; nausea, flatulence, and intestinal spasm.

Action and Toxicology.—Inhaled, sweet spirit of nitre has the general effects of the nitrites, producing arterial excitement, throbbing and dizzy headache, cyanosis, thready pulse, convulsions and death. Internally, excessive doses cause some of these symptoms, together with gastro-intestinal irritation with colic and vomiting. The treatment of poisoning by inhalation is fresh air and artificial respiration in the recumbent position, dashing cold water upon the body, with hot applications to the feet, and the use of ammonia and other stimulants.

Therapy.—*External.* To relieve pain and reduce inflammation, sweet spirit of nitre may be applied and allowed to evaporate (to prevent blistering), in local neuralgias, neuralgic headache, glandular enlargements, mumps, threatened boils and carbuncles, abscesses, and inflammatory swellings. It is of much value in rhus poisoning and the bites and stings of insects; and sometimes relieves the itching of urticaria. Only an acid-free preparation should be used lest cutaneous irritation be caused by it.

Internal. Sweet spirit of nitre is a stimulating diuretic and mild diaphoretic, according to the manner of using it. It is also, to some degree, antispasmodic. If given in iced or cold water, and the patient be lightly covered, it proves diuretic, though as such it often fails. If given in water at ordinary temperatures and the patient be well covered it induces mild diaphoresis, and in this manner contributes to reduce temperature in mild cases of fever or inflammation. Spirit of nitre is an old-time remedy once employed much more than at the present time. Moreover, it was often given in too large doses, which either aggravated or failed to meet conditions it was intended to relieve. As a remedy for acute and ephemeral febrile attacks in little children it is frequently useful, and is so used, but more often abused, though rarely with harm, in household practice. For this purpose it is less efficient than aconite. It is far less effective if fever be high or inflammation active than other agents; but if there is a low grade of fever, with marked irritation of the nerve centers, with tendency to spasm it will render good service. It is, therefore, more useful in asthenic than sthenic conditions.

There is one condition in which we regard it as directly indicated—in the acute nephritis following scarlet fever. But to be safe and accomplish a steadily curative effect the dose must be *small*. A half drachm added to four ounces of water and the solution administered in teaspoonful doses every two hours will gently change the condition for the better where a larger amount puts too much work upon the already over-burdened kidneys.

No other agents have been more effective in this disorder, though the administration of apis, aconite and gelsemium produces good effects. This spirit was once employed for dropsy dependent upon a diseased heart, and less upon a diseased kidney, but there are far better agents for this condition. As it was usually given with squill, digitalis or potassic diuretics, it is but fair to presume that most of the good was accomplished by these aids. It is sometimes of value in the strangury of vesical irritation or debility and in that produced by cantharides; and to dilute the urine in ardor urinæ and gonorrhœa, thus modifying the acridity of that secretion. In other mildly inflammatory states of the urinary tract it does good, and especially in children who suffer from painful and difficult urination. For suppression of urine in children it is an admirable remedy. It is harmful, however, in retention of urine; for being diuretic, it increases the flow into an already overfilled and distended bladder, causing greater discomfort and pain. Here the catheter is needed. Conversely it is a very acceptable and useful remedy, given with potassium citrate, where concentrated, acid and high-colored urine is the provoking cause of incontinence of urine in children. After the urine is cleared and non-irritating, nux vomica, belladonna, or rhus aromatica may be indicated to strengthen the vesical sphincter. Spirit of nitrous ether easily deteriorates, or changes to a most dangerous compound, it must be remembered, hence great care must be taken to have a fresh and reliable spirit.

SPONGIA USTA.

Burnt Sponge, Spongia Tosta.

The skeleton of *Spongia officinalis*, Linné, Class: Poriphera; Order: Ceratospongia, roasted brown in a closed vessel and reduced to powder. *Dose*, 30 to 180 grains.

Preparation.—*Specific Medicine Spongia. Dose*, 1 to 10 drops

Specific Indications.—Croup; enlarged thyroid.

Action and Therapy.—Spongia is believed by some to have alterative properties depending upon iodine and bromine and associated compounds derived from the sea. For this purpose it has been quite largely used in cases in which iodine is apparently indicated, as goitre. It is thought to act better than iodine in some forms of the latter. Spongia is much employed also as a remedy for laryngeal irritation, and it seems to have been remarkably effective in croup and croupal types of cough.

STAPHISAGRIA.

The ripe seeds of *Delphinium Staphisagria*, Linné (Nat. Ord. Ranunculaceæ). Mediterranean Basin; cultivated. *Dose*, 1 to 2 grains.

Common Name: Stavesacre.

Principal Constituents.—Fixed oil; a poisonous crystalline alkaloid, *delphinine* ($C_{22}H_{36}O_6N$), acting like aconite; an amorphous narcotic alkaloid delphinoidine ($C_{42}H_{65}O_7H_2$), delphisine ($C_{27}H_{46}O_4N_2$), a crystalline alkaloid, a slightly water-soluble alkaloid, staphisagrine ($C_{22}H_{32}O_5N$), and the alkaloid staphisagroine ($C_{20}H_{24}NO_4$). The first three alkaloids are soluble in alcohol, chloroform and ether.

Preparation.—*Specific Medicine Staphisagria. Dose*, 1 to 5 drops.

Specific Indications.—"Irritation and chronic inflammatory conditions of the genito-urinal tract; painful, scalding micturition; prostatorrhœa; urinal incontinence in aged men; urethral irritation, with a sensation of in-

complete urethral evacuation—a sensation as if a drop of urine were rolling along in the canal; menstrual derangements, with long intermenstrual intervals and prolonged flow; spermatorrhœa in anemic subjects; depression of spirits; hypochondriasis; hysteria, with uterine or ovarian irritation, despondency, moroseness, and violent outbursts of passion; black specks before the eyes in reading; mental irritability and restlessness in painful and exhaustive diseases; uterine disorders, with feeble pelvic circulation; deep-seated soreness, dragging and bearing-down pains; leucorrhœa; and painful urination." (*American Dispensatory.*)

Action and Toxicology.—In small doses staphisagria quiets nervous irritation. In large doses it is a depressive poison, acting very much like aconite to which it has a close botanic relationship, but does not produce such intense benumbing and tingling effects as the latter. It causes decided gastro-intestinal irritation and depresses the heart and circulation, and the motor tracts of the cord. Its topical use has proved fatal to a child, and its toxic symptoms are closely analogous to those of poisoning by aconite. It kills by paralyzing the respiratory centers (asphyxia). One of its alkaloids has narcotic properties; and another, delphinine (dose 1/60 to 1/10 grain), has an acrid and benumbing taste and an action much like aconitine, an action which is possessed in greatest force by the combined alkaloids of stavesacre. It is exceedingly poisonous.

Therapy.—*External.* Locally staphisagria seeds are parasiticide and analgesic. Delphinine, though it should not be employed, acts upon painful areas like veratrine. The powdered seeds may be mixed with fats and applied for the destruction of pediculi. An ointment (4 parts in 20 of benzoinated lard) is a good form. Equally effectual and more manageable is an equivalent dilution of the specific medicine with vinegar, dilute acetic acid or ether. It must not be used unless the skin is intact, and then with caution as to quantity. It is also said to be fatal to the itch mite which causes scabies.

Internal. Staphisagria is sedative and a remedy of limited power in irritation of the mucous membrane of the genito-urinary tract and some phases of nervous disorders. It is contraindicated by active inflammation. From a very early date its local application has been credited with the destruction of pediculi. As Scudder recorded some years ago, the nervous conditions best met with staphisagria are those shown by hysteria and hypochondriasis with depression of spirits, despondency, moroseness, and violent outbursts of passion. As a rule, the sexual disorders benefited by staphisagria are those accompanied by nervous depression, or at least by marked irritability. When properly indicated, it proves useful in the treatment of prostatorrhœa, spermatorrhœa resulting from masturbation, in chronic irritation or inflammation of the genito-urinary tract resulting from gonorrhœa or from cold, and in prostatitis, gonorrhœal or otherwise, all of these conditions being associated with depression of spirits and a sense of restlessness and irritation along the course of the urethra. It is especially useful in renal incontinence of old men with teasing desire to urinate frequently, and in the urinary annoyances attendant upon uterine disorders. It will not relieve all cases of spermatorrhœa, but if carefully prescribed, according to indications it will prove beneficial in the majority of cases.

The best marked indication we have found for staphisagria is a sense of incomplete urination with a feeling as if a drop of urine were constantly attempting to pass along the urethral canal. The indications for staphisagria, as concisely stated by us in the *American Dispensatory*, are given on pages 653 and 654 under Specific Indications.

STICTA.

The lichen *Sticta Pulmonaria*, Linné (Nat. Ord. Lichenes). Found upon tree trunks and rocks in England and the eastern United States, mostly in mountainous districts.

Common Names: Lungwort Lichen, Lung Moss, Oak Lungwort, Tree Lungwort.

Principal Constituent.—Stictic acid, allied to cetraric acid from Iceland moss.

Preparation.—*Specific Medicine Sticta. Dose*, 1/10 drop to 10 drops.

Specific Indications.—"Pain in the shoulders, back of neck, and extending to the occiput" (Scudder). Soreness and dull pain in the pectoral muscles, increased by deep breathing; irritation of the medulla, and parts supplied by the vagus; irritative cough; persistent dry, rasping wheezing, or short, hacking cough, with quick-darting pains in the thoracic walls; hay fever with headache; catarrhal disorders with frontal tension, sneezing, coryza and conjunctival hyperæmia or inflammation.

Action and Therapy.—Sticta relieves pain and muscular soreness confined chiefly to the neck, head, and chest, and irritation in parts supplied by the vagus. Thus it proves useful in so-called subacute rheumatic pain extending from the shoulder to the base of the occiput, or in the chest walls, or the smaller joints. Muscular pain accompanying catarrhal fever and epidemic influenza is relieved by it. Over the various types of cough described under specific indications it has a controlling force, provided there is atony and the pneumogastric is involved. When these conditions prevail it has aided in the reduction of fever, and checked chills and night sweats, thus giving comfort in pulmonary tuberculosis. Sick headache, acute catarrhal disorders, whooping cough, summer colds, etc., accompanied by cough and muscular soreness, have been reported benefited by it. The pulse in sticta cases while soft, has a peculiar wire-like vibration or thrill. The chest soreness relieved by it simulates lameness, is increased by taking a deep breath, and feels like that arising from a bruise or muscular overexertion.

STILLINGIA.

The dried root of *Stillingia sylvatica*, Linné (Nat. Ord. Euphorbiaceæ). Southern United States growing in sandy soils. *Dose*, 5 to 60 grains.

Common Names: Queen's Root, Queen's Delight, Silver Leaf, Yaw Root.

Principal Constituents.—Tannin, sylvacrol, an acrid resin—volatile oil; doubtfully an alkaloid, stillingine.

Preparations.—1. *Specific Medicine Stillingia. Dose*, 1 to 30 drops.

2. *Linimentum Stillingiæ Compositus*, Compound Stillingia Liniment (Stillingia Liniment). (Contains Oil of Stillingia, fl℥j; Oils of Lobelia and Cajuput, aa, fl℥ss; Alcohol and Glycerin, aa, fl℥ij.) *Dose*, 1 to 5 drops.

Specific Indications.—Feeble tissues, with tardy removal of broken-down material, and slow reconstruction of tissues; mucosa red, glistening and tumid, with scanty secretion; skin lesions, with irritation and ichorous discharge; periosteal pain and nodes; syphilitic and strumous cachexia; laryngeal irritation with paroxysmal hoarse croupal cough; post-faucial irritation with cough; irritative winter cough.

Action and Therapy.—Stillingia is an important alterative when a good preparation can be procured. Much of the failure to achieve results with it has come from the use of medicines prepared from old and worthless material. Large doses of an active preparation will cause increased cardiac activity, excessive bronchial secretion, vomiting and bilious purging, with a peculiar gastro-intestinal burning sensation, and more or less resultant prostration. For a long time it has been praised as a remedy for syphilis, and discordant views are expressed by clinicians as to its value as such. We do not believe it antisyphilitic, but it is one of the best alteratives that can be exhibited in syphilitic and strumous cachexias, greatly aiding other and more powerful agents, as the iodide of potassium. In all phases of secondary syphilis—cutaneous syphilides, mucous patches, ulcers, and periosteal pain and nodular and glandular enlargements—it renders good auxiliary service through its depurative action. It must not be misunderstood, however, that any claim to a cure of syphilis by stillingia can be justified by past experience. Nevertheless, it is one of the best of remedies to modify the disease and assist other agents to cure. The best indication for it is the red, shining or glistening mucous membranes with scanty secretion, and the presence of retained débris of tissue waste with tardy repair of structure.

While sometimes used early in syphilis, during the primary stage, we can see no reason for its use before broken-down products begin to appear as it is not *per se* an antisyphilitic; and experience has shown the drug to be of the greatest value in the secondary stage of the disorder.

Stillingia is valuable, though less so than Stillingia Liniment (see below) in laryngeal irritation and cough, and other irritative states of the bronchi and faucial arch, with repressed secretion. Thus it may be used in chronic laryngitis, chronic bronchitis, the chronic coughs of the strumous individual, where glandular swelling and scanty elimination are evident. It is one of the most effectual drugs we have ever used for the irritable winter cough of the middle-aged and old. Stillingia may be used in chronic periosteal rheumatism, so-called, of unproved origin, but probably syphilitic; and in skin diseases having a remote syphilitic history.

Hare advises its use in chronic constipation to increase intestinal secretion, and for hemorrhoids depending upon "hepatic engorgement and intestinal atony. Likewise for 'pasty-looking', white, 'putty-faced' children, who are anemic or strumous, and who never have any appetite, or are subject to middle-ear trouble and general debility"; the remedy to be used for some time.

Compound Stillingia Liniment. This compound produces both stimulation and relaxation. Locally applied to the throat and chest and given internally on sugar or in syrup this is one of the most perfect remedies for spasmodic and catarrhal croup of young children. A cloth wet with cold water applied around the neck and covered with a dry binder enhances the value of the treatment. Many cases of acute cold and sore throat are speedily arrested by the same treatment. We would be at a loss to treat croup and croupal coughs without this admirable heritage from the Eclectic pioneer physicians. Sometimes spasmodic asthma is promptly checked by it. Pushed too far stillingia liniment causes nausea and vomiting, but it is never necessary to carry it to such a stage. A few drops upon sugar,

or in glycerin or syrup, promptly relieve dry, rasping, laryngeal cough, and in chronic bronchial cough with either scant or profuse expectoration it gives splendid results. Stillingia liniment is sometimes used like other embrocations for lame, rheumatic, inflamed, and otherwise painful parts; and with very gentle massage it gives relief to the soreness of the chest-walls from difficult breathing experienced by consumptives, as well as the pains in the limbs so frequently a torture to this class of sufferers.

STRAMONIUM.

The dried leaves of *Datura Stramonium*, Linné, or of *Datura Tatula*, Linné (Nat. Ord. Solanaceæ). A common weed everywhere in the United States, especially the latter. *Dose*, 1 to 2 grains.

Common Names: Jamestown Weed, Jimson Weed, Thornapple.

Principal Constituents.—The chief datura alkaloids are *hyoscyamine*, and some *atropine*, and *hyoscine*. *Daturine* is probably a mixture of the first two. (See also *Hyoscyamus* and *Belladonna*.)

Preparations.—1. *Specific Medicine Stramonium. Dose*, 1/30 to 5 drops.

2. *Unguentum Stramonii*, Ointment of Stramonium. Best preparation is that carefully prepared by simmering fresh stramonium leaves with petrolatum, on a water bath, so that burning cannot take place. The official ointment is prepared from extract of stramonium.

Specific Indications.—Cerebral irritation; furious raging and destructive delirium; face deeply congested, red, and bloated; loquaciousness; restlessness and fearfulness; superficial and localized pain; spasms with pain; convulsive cough; purely spasmodic asthma; the opium habit.

Action and Toxicology.—The action of stramonium is closely similar to that of belladonna. If anything, it has a more profound effect upon the sympathetic system and upon the vagus. If the dose be large enough it will disturb the rhythm of the heart action and induce delirium, exerting these effects more readily and more powerfully than does belladonna. Stramonium is probably the most violent deliriant of the solanaceæ. Its alkaloid daturine is closely akin to, if not identical with, hyoscyamine. American manufacturers are now utilizing stramonium for the preparation of atropine from daturine, and during the year 1917 of the great World War this source practically prevented an atropine famine in the American drug markets.

Therapy.—*External.* Fomentations of stramonium leaves, or the bruised fresh leaves may be applied to inflamed and painful parts to reduce swelling and relieve pain. In this manner it is often useful in mammitis, orchitis, swollen joints, and painful external hemorrhoids. An ointment of stramonium, carefully prepared without burning it, is an excellent application for painful and engorged piles, or as the ointment basis for other agents to be used for the same purpose. It is also soothing in cutaneous hypertrophy around the anus with intolerable itching and sometimes semi-purulent secretion. It is rendered more effective by incorporating with it 5 to 10 per cent of salicylic acid. Stramonium leaves, alone, or with tobacco, lobelia, grindelia, and nitrate of potassium are universally employed as an "asthma powder". It is used by igniting the powder and inhaling the vapors, or by smoking it in a pipe or in the form of cigarettes. It is among the most prompt of measures for the temporary relief of the paroxysms of purely spasmodic asthma.

Internal. The specific indications for stramonium are those indicating impeded innervation. The face is red and bloated and of a deeper congestive appearance than that for belladonna; there is continual talking and the patient is uneasy, cannot rest well in any position, and is possessed of an ungrounded fear. There may or may not be furious, enraged, or destructive delirium. Localized and superficial pain, or spasm with pain, is experienced. It is also indicated by convulsive cough, and purely spasmodic asthmatic attacks. When the dyspnœa is dependent upon respiratory or cardiac lesions it is less useful. In all stramonium cases there is *cerebral irritation*—causing most often violent excitability or less frequently depressive irritability. The dose, therefore, should be governed accordingly; medium doses for the former, minute doses for the latter. In no instances are the full physiologic doses necessary except in the cure of the opium habit, when the drug may be pushed to the full limit of endurance. It remains to be seen whether permanent damage may be done to the intellectual faculties from such dosage, as is the case with atropine.

In medicinal doses stramonium is an anodyne antispasmodic, without causing constipation or lessening of the excretion of urine, and will prove serviceable in many instances where opium cannot be given. Unlike hyoscyamus it does not readily produce sleep, but if sleep results from its administration, it is generally due to the fact that the stramonium alleviates the pain, or allays the nervous irritability upon which the insomnia depends. It is quite remarkable that a plant so closely allied to belladonna chemically should be so different in some of its therapeutical effects, and particularly in regard to alleviating pain. Thus for deep-seated pain, as of neuralgia, it is far less effective than belladonna, but for superficial neuralgia, and especially when locally applied, it is more effective than the former. It illustrates well the fallacy of claiming certain effects from a medicine because of the known physiological action of the drug—the therapeutical effects often being widely at variance. Bartholow well expressed the situation and unconsciously forecast collodial therapy when he observed: "Identity of chemical constitution does not always mean identity in physiological action and in therapeutic power. Differences in molecular arrangement, not appreciable by chemical analysis, may influence to a great extent mode of action".

Stramonium is useful for the relief of pain, but less so in general than belladonna. When pain is due to irritability, as in enteralgia, gastritis, and enteritis, neuralgic dysmenorrhœa, spasmodic intestinal pain, tic douloureux, sciatica, and the pains of chronic rheumatism, it is useful but does not compare with either belladonna or hyoscyamus, either of which are incapable of subduing severe pain. Stramonium serves well, however, in headache, with dizziness and hyperacidity of the stomach, and in gastric headache when associated with nervous erethism and unsteadiness.

Like hyoscyamus, stramonium meets two classes of nervous and mental disorders—the mentally excited, with furious delirium and motor-excitability; and the depression of nervous debility. The first requires medium doses; the last the small dose. In the acute delirium of acute mania it quiets the violent, boisterous and angry patient bent upon destruction of everything and everybody, including himself. Equally effective

is it in the quieter and busy delirium of acute fevers. It finds a use in delirium tremens, nymphomania, in epilepsy followed by maniacal excitement, in hysterical mania with alternate fits of weeping and laughter, and in globus hystericus.

Stramonium has been revived in recent years as a remedy to assist in breaking away from the opium habit, and considerable success has attended its use. This is now possible since the nature of the alkaloidal contents of this and the allied solanaceous drugs are better understood. Many years ago Locke advised the following formula: ℞ Specific Medicine Stramonium, fl℥ss; Tincture of Cardamom, fl℥iijss. Mix. Sig.: Begin with ten drop doses and increase as may be necessary.

Stramonium is invaluable in convulsive forms of cough and should have wider recognition for this purpose, in which it is fully equal to hyoscyamus. It is the best agent we have used to control whooping cough where the paroxysms are severe and bleeding from the mouth or nose occurs. As a general cough medicine it is better and safer than opium, because it does not restrain the excretions. Like atropine it is useful in hemoptysis brought on by fits of coughing or during spasms.

STRONTII BROMIDUM.

Strontium Bromide. (Formula: $SrBr_2.6H_2O$.)

Description.—Colorless and odorless, transparent crystals, having a saline, bitter taste; deliquescent in moist air; efflorescent in very dry air. Very soluble in cold and hot water, less so in alcohol; insoluble in ether. *Dose*, 5 to 30 grains.

Specific Indications.—Nervous erethism; lactic and acetic fermentation, with dilatation of the stomach.

Action and Therapy.—Strontium bromide is claimed to be less irritating and depressing than the other bromides, and may be used where bromide medication is indicated, especially where necessary to avoid the peculiar effects of the potassium base in the potash salt. It is regarded as useful in gastric indigestion with hypersecretion and pain, and where lactic and acetic fermentation occurs, and where decomposition of food with the formation of gases takes place, resulting in gastric dilatation. Germain Sée believed it to greatly lessen the output of sugar in saccharine diabetes.

STROPHANTHUS.

The dried ripe seeds of *Strophanthus Kombé*, Oliver, or of *Strophanthus hispidus*, DeCandolle, deprived of their long awns (Nat. Ord. Apocynaceæ). West and east coast of tropical Africa. *Dose*, 1 to 2 grains.

Principal Constituents.—*Strophanthin* ($C_{31}H_{48}O_{12}$—8 to 10 per cent), a bitter glucoside yielding glucose and strophanthidin (see below), kombic acid, inert alkaloid ineine and tanghinin.

Preparation.—*Tinctura Strophanthi*, Tincture of Strophanthus. *Dose*, 1 to 10 drops.

Derivative.—*Strophanthinum*, Strophanthin. Commercial strophanthin is a glucoside or mixture of glucosides occurring as a permanent white or yellowish powder, readily soluble in water and diluted alcohol; less soluble in absolute alcohol; and almost insoluble in ether and chloroform. It should not be tasted except in very dilute solution. *Average Dose*, 1/60 grain (by mouth); 1/80 grain (intravenously).

Specific Indications.—Weak heart, due to muscular debility; muscular insufficiency; rapid pulse, with low blood pressure; cardiac pain, with dyspnœa.

Action.—Externally applied, strophanthus preparations appear to exert no special effects unless mixed with hydrous wool fat, when the action of the drug is said to be apparent. The seeds, however, applied to the cornea produce prolonged anæsthesia (Steinbach). Three or four drops of a solution of strophanthin (1 to 1000) applied to the cornea also produce total anæsthesia, including insensibility to heat and cold (difference from cocaine), these sensations being the last to yield and the first to revive after its application. De Schweinitz and Hare found that ocular anæsthesia occurs only in dogs, not in man. A disagreeable irritation of the conjunctiva has been produced by this use of strophanthin; it has no effect on intraocular pressure or upon vision-accommodation. Strophanthus is a muscle poison. When taken internally it acts primarily upon the voluntary muscles, increasing their contractility, and if the dose be poisonous it causes tetanic paralysis, the muscles being unable to regain their former normal flexibility. Under its toxic influence the muscles first become enfeebled, then somewhat rigid, fibrillary twitchings, which are spontaneous, non-rhythmical and increasing contractions, somewhat similar to those of chorea, are observed, and finally the muscles become pallid, non-contractile and hard. It is these effects that render strophanthus an efficient arrow-poison, the muscular paralysis produced rendering the animal an easy prey to its pursuer. When the muscles are in extreme paralysis, lactic acid has been observed to replace the normal alkaline condition. Strophanthus muscular paralysis consists chiefly in diminishing the ability of the muscles to relax, and then in destroying this capability, producing a condition difficult to distinguish from rigor mortis.

Strophanthus does not appear to affect either the spinal cord or to act upon its nerve trunks. Its specific action upon the heart is due to direct contact (through the blood) with the muscular fibres of that organ, and not to any effect upon the cardiac nerves. A large dose so increases contractility that a more perfect, energetic, and prolonged systole is the result, and the capability of the muscle to relax is lost, or so diminished that diastole can not take place; after death the ventricle is so completely contracted as to almost efface the cavity, the heart passing from life directly into *rigor mortis*. According to some it may cease either in systole or diastole. The caliber of the blood vessels is but little influenced by strophanthus, it having no effect upon the vaso-motor control. It is strongly diuretic in so far as lack of secretion depends upon low blood pressure, i. e., it increases diuresis in so far as increased blood pressure produces an increased urinary product. It is also thought by some to act especially upon the renal secreting structures. When one is in good physiological condition it is said to have little or no diuretic action; but in diseased conditions, with low blood pressure, it is asserted to excel digitalis in diuretic power.

If strophanthus be given in large doses it produces gastro-intestinal irritation with vomiting and diarrhœa. Small doses, however, act as a bitter tonic, improve the appetite, augment gastric action, and promote digestion. In proper doses it strengthens the heart-muscle, slows cardiac action, increases the interval between beats, reduces the pulse-rate, and powerfully increases arterial tension (but less so than digitalis), not by any effect (to any extent at least) upon the vessels, but by strengthening the

heart-muscle, giving increased power. Whether or not the drug is cumulative is still an unsettled question, though it probably is not unless given too freely in overlapping doses. The action of a good strophanthus upon the heart is probably greater than that of any other drug, and its active principle, when pure, is of far greater potency than the digitalis derivatives.

Therapy.—Strophanthus is a remedy for *weak heart* from debility of the cardiac muscle, with lack of proper contractile power, as shown by a rapid, weak pulse, and very low blood pressure. The disordered action of the heart is due to lack of tonicity and not from weak walls due to deposition of fat, in which case the drug must be used with extreme circumspection, though in small doses it has been recommended by some as a remedy for cardiac fatty degeneration, as it has also in atheroma of the arteries in the aged. It is also a remedy for præcordial pain and for cardiac dyspnœa. It has been strongly endorsed in heart affections with disorders of compensation. Strophanthus is useful in valvular heart disease only so far as there is muscular insufficiency, where the compensatory increase of muscular action is not sufficient to offset the valvular insufficiency. "It has been reported useful in cases of mitral regurgitation with dilatation; mitral stenosis with regurgitation; regurgitation with œdema, anasarca, dyspnœa, etc.; mitral insufficiency with palpitation, præcordial pain, cyanosis, dyspnœa, etc." (*Annual of Eclectic Medicine and Surgery*, Vol. I, page 25.) Schiller (*ibid.*, page 40) says: "When the balance in the circulation has become impaired, as a result of insufficiency of the valves of the heart from organic disease with a general dropsical condition, strophanthus, although affording temporary relief in some cases, has failed in every case in my hands to reëstablish the compensation. The result was the same whether the mitral, the tricuspid, or the semilunar valves were most involved." These are the cases of heart disease in which digitalis is the remedy. However, evidence is strong to show that when the muscular insufficiency can be corrected in these cases then the remedy will do good service. Schiller looks upon the drug as a remedy for what is ordinarily termed functional heart disease, when not sympathetic. The heart-action is rapid or abnormally slow, or the rhythm is bad, a condition common in school children at puberty when forced to overstudy. Strophanthus is well endorsed as a remedy for the irritable heart of tobacco smokers, masturbators, and those addicted to the use of alcoholics and narcotics.

Acute endocarditis and the reflex palpitation of neurasthenic, hysterical, and chlorotic subjects have been signally benefited by strophanthus, while it appears to give better cardiac power during or after typhoid and other adynamic fevers, when heart failure threatens. It should be remembered as a remedy for threatened cardiac failure in any disease. Full doses should be given for the relief of angina pectoris, and the remedy should be continued for a period after the attack. It is less efficient, because slower in action, than amyl nitrite or nitroglycerin, but may be given for more permanent effects after the evanescent action of these agents has passed off. In pulmonary congestion and in acute bronchitis or acute pneumonia it may be employed when there is deficient heart power.

Strophanthus has been praised for prompt results in cardiac asthma and bronchial asthma, with œdema; in whooping cough it has many

advocates. Goitre is asserted to have been cured with it, and large doses (8 to 25 drops of the tincture several times a day) have been said to cure a large proportion of cases of exophthalmic goitre, with irregular cardiac action. Schiller reported great relief to the heart symptoms in two cases of exophthalmic goitre, with disappearance of the bronchocele in one case (*Annual of Eclectic Medical and Surgery*, Vol. I, page 40). Strophanthus has also been lauded as a remedy for chronic nephritis, with albuminuria, in anasarca, and in ascites from hepatic cirrhosis. It is of little value in œdema and other forms of dropsy or kidney affections unless dependent upon cardiac disorders.

Strophanthus does not take the place of digitalis, each having its own field of action. It may, however, follow the use of other heart tonics, and particularly those evanescent in action, as amyl nitrite and nitroglycerin. As it does not affect the caliber of the vessels, it may be used in preference to digitalis when it is not desirable to add extra work to the heart. It is well borne by the aged and by children. Wilcox (*Materia Medica*) sums up the advantages of strophanthus over digitalis as follows: "Greater rapidity, modifying pulse-rate within an hour or two; less marked vaso-constrictor effects; greater diuretic powers; no disturbance of digestion from properly made preparations; absence of so-called cumulation; greater value in children; great safety in the aged." He further summarizes its uses as follows: "It should, therefore, be the remedy of choice for all patients in whom we wish to establish compensation; for arterial degeneration in which a remedy which causes more energetic cardiac contraction is required; for cardiac disease when a diuretic is necessary; for weak or irritable hearts; and for the treatment of cardiac disease in childhood or old age." These we would qualify by adding when the heart-muscle is at fault.

Strophanthus should be avoided or very cautiously used in advanced muscular degeneration, in pronounced mechanical defects of the heart, and in fully and over-compensated hearts. Strophanthus is also contraindicated in aneurism, advanced myocardial degeneration, and in well developed atheroma and arteriosclerosis. Unfortunately there is a great variation in strength in various batches of tincture of strophanthus owing to lack of uniformity in the crude drug employed. The dose of tincture of strophanthus is from one to ten drops; of strophanthin, 1/500 to 1/60 grain, all of which should be cautiously administered.

STRYCHNINA.

Strychnine.

An alkaloid derived from Nux Vomica. It may also be obtained from other seeds of the Loganiaceæ.

Description.—Permanent, odorless, transparent, colorless crystals, or a white, crystalline powder. Its solutions are extremely bitter and should be tasted only with extreme caution, and only when they are highly diluted. Almost insoluble in water, somewhat soluble in alcohol, and very readily in chloroform. *Dose*, 1/60 to 1/20 grain.

Preparations.—1. *Strychninæ Sulphas*, Strychnine Sulphate. Odorless, efflorescent (in dry air), white or colorless crystals, or a white crystalline powder. Bitter. Observe precautions given under Strychnina. Freely soluble in glycerin, soluble in water and alcohol (more readily in these when boiling), and sparingly in chloroform. *Dose*, 1/60 to 1/20 grain.

2. *Strychninæ Nitras*, Strychnine Nitrate. Permanent, odorless and colorless shining needles or a crystalline, white powder, without odor; taste bitter. See cautions under Strychnina. *Dose*, 1/60 to 1/20 grain.

Specific Indications.—Threatened shock; cardiac failure (see also *Nux Vomica*).

Action and Toxicology.—(See *Nux Vomica.*)

Therapy.—(Compare Nux Vomica.) Strychnine is a most powerful stimulant, and as such is the most useful remedy for sudden depression, or atony of the nervous system. It is the most commonly employed stimulant for shock and collapse of cardiac and respiratory powers. In fact, the important office of strychnine is that of an "emergency remedy". It should never be given for long periods as a nerve bracer and stimulant to the heart, a too common custom which should be severely condemned. We cannot be too insistent in cautioning that it is an exceedingly powerful spinal and medullary stimulant that may stimulate to exhaustion, and that its prolonged use invites nervous erethism, often provokes a low-running fever, and causes collapse by exhaustion from over-stimulation. It is an admirable and most satisfactory medicine when rightly used; and a vicious weapon when abused.

Like nux vomica, its parent drug, strychnine has no place in treatment when acute inflammation is present. An apparent exception to this dictum is the advanced stages of bronchitis, pneumonia, and in broncho-pneumonia, when the circulation becomes embarrassed from failure of the right heart, and secretions are abundant but there is lack of power to expectorate.

First, strychnine is a remedy for shock from accident or surgical operations. The concensus of present-day opinion inclines to its use just as shock threatens, rather than its administration previous to operation when no evidence of shock is present. The former custom of using it at all stages of operative work is now quite generally condemned, reserving it for its specific use at the moment of emergency. When the heart-power suddenly flags, either from the anæsthetic or operation, or from accident, an intramuscular injection of 1/10 grain of strychnine sulphate or nitrate should be given immediately, associated in most instances with 1/60 grain of atropine sulphate. In case of prospective need the hypodermic should be loaded and ready for immediate use.

Strychnine and atropine are the most valuable stimulants for cardiac and respiratory failure in poisoning by alkaloids, narcotics, early stages of morphine, opium, chloral poisoning, or by foods, or in any case of acute poisoning attended with collapse of breathing and the circulation. It should be used in asphyxiation from gas and water, and in chloroform narcosis.

In pneumonia, when the heart-power begins to fail and the circulation through the lungs is impeded, or life is threatened from dilation of the right heart, strychnine is urgently needed to tide the patient over a crisis, and sometimes means the difference between life and death. From 1/30 to 1/20 grain may be given at once, and repeated as called for. Usually 1/150 to 1/100 grain of atropine sulphate may be consentaneously administered. In shortness of breath from atony and where nerve power is so greatly depressed that the patient must breathe by voluntary effort, strychnine is distinctly indicated. Sometimes nux vomica will answer as well or better. Such a condition often occurs in typhoid fever and in asthma in the nervously depressed. The patient fears to go to sleep lest he be

awakened by a sudden sense of suffocation. For this purpose strychnine and arnica are the two best remedies. It is frequently useful in the winter cough, with profuse secretion, of aged persons, though nux vomica and capsicum are to be preferred. Strychnine (and nux vomica) is a very helpful drug to use temporarily for the asthenia of typhoid fever and other low types of disease, when the weakness depends upon depressed spinal innervation and imperfect or feeble respiration. It is of marked utility in the cold stage of congestive intermittents, and in ague with atony of the stomach and impaired nerve force. In atonic diarrhœa, in cholera, and in cholera morbus it tends to prevent collapse and to restrain the evacuations. Nux vomica serves a similar purpose, but is not quite so prompt in action.

Some form of strychnine, usually the nitrate, enters into the institutional treatment of dipsomania. More or less success attends its use according to the extent of the coöperation of the patient to aid in his own cure.

Strychnine is a very useful but often abused remedy in diseases and disorders of the nervous system. Provided the inflammatory stage, if there be any, is passed, it is an agent of great power to strengthen depressed function or to restore impaired activity. If degeneration of nerve substance has taken place, as sclerosis, it is useless to ply the patient with strychnine or nux vomica, as is frequently done following severe nerve destruction. But if there is good reason to believe that the nervous impairment is merely functional, then the use of these drugs is not alone justifiable but decidedly beneficial. We have an instance of their good effects in the restoration of function, partially or completely, following hemiplegia and acute poliomyelitis, provided we wait until all traces of the original cause and the inflammation have passed, and we have only the results of these maladies to deal with. It should never be used during the course of acute or subacute neuritis; and it is of no value in paralysis agitans. Long after a hemiplegic attack it may be used to stimulate the unkilled trophic cells of the spinal marrow to increased activity and thus improve their nutrition. It is said to give the best results when the paralyzed muscles are completely relaxed, and asserted to be more useful in paraplegia than hemiplegia. When paralysis is more purely functional, as when hysteric, neurasthenic, or that following diphtheria or syphilis, it stimulates to functional activity; and is also useful after lead and arsenic paralyses. After apoplexy it is usually harmful on account of the increased blood pressure caused by it and the added danger of causing renewed hemorrhages. Strychnine should never be used after any form of paralysis while there are still remaining symptoms of congestion, myelitis, or spinal meningitis; nor should it be given any patient within several months after a cerebral hemorrhage, or at any time when there is headache, dizziness and ringing noises in the head or ears. It is sometimes very valuable in functional neuralgias associated with general debility. Strychnine is almost specific for alcoholic and tobacco amblyopia; and it may be used for eye conditions and for disorders of the bladder and reproductive tract named under Nux Vomica (which see). While useful in many of the gastro-intestinal disorders, nux vomica is usually preferred to its alkaloids.

SULPHONMETHANUM.

Sulphonmethane, Sulphonal. (Formula: $(CH_3)_2C(SO_2C_2H_5)_2$, or $(C_7H_{16}S_2O_4.)$

Description.—Odorless, colorless and nearly tasteless crystals, or a crystalline powder. Very sparingly soluble in cold water, but quite readily in boiling water or chloroform, less soluble in alcohol and ether. *Dose*, 1 to 3 grains for a child; 5 to 20 grains for adult. Average, 12 grains; one to two hours before bedtime, and administered in powder, milk, hot water or soup. *Do not give it in tablets.*

Specific Indications.—Insomnia from worry, mental excitement or overactivity; sleeplessness of fevers and insanity.

Action and Toxicology.—The chief effect of sulphonal is upon the brain. It produces sleep but does not relieve pain. Even in large doses it has no effect on the circulation, and but little on respiration. Prolonged use of it may be deleterious to the heart and the liver. Single doses do not, as a rule, produce any serious results. Owing to its slow solubility and absorption sulphonal does not act quickly. Among the untoward effects of the prolonged use of the drug are: Nausea and vomiting, gastric pain, languor, mental confusion, dizziness, headache, nervous exhaustion, ataxic or staggering gait, incoördination of movements, multiple neuritis, persistent cutaneous rashes, diarrhœa, sphincter paralysis, palsy of the lower extremities, anuria, convulsions, and death. A single dose has caused death after a lapse of one or two weeks. It produces a change in the blood, when long taken, which is revealed by the presence in the urine of a dark reddish-brown substance—hæmatoporphyrin—an iron-free decomposition product of hæmoglobin. This pigment causes the urine to have a deep wine color (hæmato-porphyrinuria) and is probably due to the cumulative effects of the drug, for the latter, while slowly absorbed, is also more slowly eliminated. While sulphonal is largely decomposed in the body it is partly eliminated unchanged by the kidneys, but most of it is voided as ethlysulphonic acid.

Therapy.—Sulphonal is used solely as a hypnotic. The duration of sleep produced by it cannot be prejudged with certainty. As a rule, however, it is slowly induced and quite prolonged. Pain prevents or retards its hypnotic action, and it is quite ineffectual if insomnia be due to heart disease. In fact, many declare it unsafe in the latter condition. After awakening from its effects the patient experiences mental and physical lethargy, and may remain drowsy for a day or two. When giving it for more than a night's use the kidneys should be watched, and if the least darkening or deep wine-red coloration or smokiness be observed, its use should be discontinued. This color may be observed upon the garments, which it stains, as well as in the urine. Sulphonal acts best as a hypnotic in insomnia due to worry or excitement, in mental overactivity and in the worry attending sexual derangements. In insanity and delirium tremens, and in mania with great excitement and nervous irritation it acts well; but it is better adapted to mild forms of the latter. Locke advised one to two grain doses as perfectly safe in the restlessness of teething, to ward off spasms and to produce sleep. It has given rest to drunkards who are nervous and on the verge but not in the throes of delirium tremens. Locke also advised it as a safe somnifacient in the sleeplessness of typhoid fever, declaring that it does not impair the nervous system. Sulphonal possesses less hypnotic power than chloral, but is more powerful than paraldehyde.

Probably trional and barbital are more generally effective, but sulphonal often acts when the others fail. The greatest comfort to the prescriber is the knowledge that, when given for an occasional dose, it does not depress the heart. Though sometimes advised to be given in capsule, the best form of administration is to dissolve the powder in hot water or hot tea and give it warm, for precipitation occurs upon cooling. It may also be given in milk, beef tea, or soup (delirium tremens). On account of its slow action it should be administered from one to two hours before bedtime; and the patient should not be awakened while under its influence, lest headache or giddiness result. He should be allowed to awaken naturally. The dose for a child is one to three grains; for an adult, five to forty grains, the average being ten to twenty grains.

SULPHONETHYLMETHANUM.

Sulphonethylmethane, Trional. (Formula: $C_8H_{18}S_2O_4$, or $(CH_3)(C_2H_5)C(SO_2C_2H_5)_2$.)

Description.—Odorless, colorless, shiny, scaly crystals; in aqueous solution having a bitter taste; soluble in boiling water and cold water, and in alcohol and ether. *Dose*, 10 to 30 grains.

Action and Therapy.—Trional is a quickly absorbable and non-cumulative hypnotic, acting much like sulphonal, but with less likelihood of producing deleterious effects. It acts promptly, and while ordinarily perfectly safe for temporary purposes, its use should be accompanied by a saline laxative should the patient be inclined to constipation. If given for any length of time it should be omitted for several days at a time and then renewed, for it is only through its continued use that disagreeable after-effects have been observed—notably among these are suppression of urine and changes in the blood revealed by a dark product in the urine—giving to that excretion a deep red or black color (hæmoporphyrinuria). Upon observing this coloration the use of trional should be stopped at once and vigorous purgation instituted. Like sulphonal it sometimes causes multiple neuritis, when given for a long time, even in small doses. Trional may be used for functional insomnias, particularly in the insane and in narcotic habitués. Sleep is usually induced in a half hour and continues for five or six hours. It is sometimes accompanied by dreams and nightmares. After a single dose the patient may remain drowsy for a day afterward. Trional should be given in hot fluids, as tea or broth, and not more than fifteen to thirty grains should be administered continuously. In fact, no hypnotic should be given without intermitting as often as possible, thus insuring the patient some sleep and some chance of more perfect elimination of drug products.

SULPHUR.

Sulphur (Symbol: S.)

An element mined in various parts of the world, notably in Sicily and western and southern United States.

Description and Preparations.—1. *Sulphur Sublimatum*, Sublimed Sulphur (Flowers of Sulphur), prepared by subliming crude sulphur. A fine yellow powder having a feebly acid taste and a faint characteristic odor of sulphur. *Dose*, 1 to 60 grains.

2. *Sulphur Præcipitatum*, Precipitated Sulphur (Lac Sulphur or Milk of Sulphur), prepared by boiling sublimed sulphur with slacked lime and afterwards precipitating with hydrochloric acid and thoroughly washing the precipitate with pure water. An odorless and tasteless, pale-yellow, fine and non-crystalline powder. *Dose*, 1 to 60 grains.

3. *Sulphur Lotum*, Washed Sulphur. Prepared by digesting sublimed sulphur with a dilute solution of ammonia water and finally washing with pure water. A pale-yellow powder without taste or odor. *Dose*, 1 to 60 grains.

All three sulphurs are insoluble in water and slightly dissolved by alcohol. Turpentine, most oils, ether, and chloroform more readily accomplish their solution. All forms of sulphur when burned evolve fumes of sulphur dioxide, a suffocating and irritant gas, which in the presence of live steam is a powerful disinfectant and deodorizer.

4. *Unguentum Sulphuris*, Sulphur Ointment. (Sublimed Sulphur, five per cent, and Benzoinated Lard.)

Specific Indications.—Hemorrhoids, with severe lumbar pain, constipation, and hard tenesmic stools, which are sometimes bloody, and the rectum protrudes (full doses); constipation or offensive tenesmic diarrhœa; anemia in scrofulous subjects where iron is ineffectual; skin blanched, iris and hair fading, feces and urine pale; cystine in urine; mucous discharge, with burning and itching; tendency to decomposition of fluids and tissues, with fetor; cough with profuse, thick secretion and lack of power to expectorate; headache, with cerebral fullness; rheumatic or darting localized pain; ophthalmia in the ill-nourished, with red swollen eyes. *Externally*. Scabies; scaly vesicular and papular eruptions; sores at the angles of the mouth, and around the nose and ears.

Action.—Sulphur, applied to the skin, may act as an irritant owing to its conversion into sulphides through the action of the secretions. It is also an antiseptic and parasiticide. The vapor of burning sulphur (sulphur dioxide) is strongly irritant and may produce inflammation of the breathing organs and asphyxia. When taken in small doses sulphur is an alterative and has a special affinity for the skin and bronchial mucosa increasing their secretions. No sensible phenomena are produced by doses of from one to six grains, but larger amounts, say one drachm, excite intestinal action and cause small soft, pasty evacuations, which, however, are never watery. Sulphur renders both the stools and the perspiration insupportably fetid, on account of the sulphuretted hydrogen which is formed. Probably the more impurities present, as excess of acid, the less pleasant its action; when pure it occasions no intestinal discomfort; when impure it causes griping. In doses of ten to twenty grains, every hour, it stimulates the circulation, raises the temperature, and finally induces sweating. If long administered the skin and breath exhale the disagreeable sulphuretted odor. The sweat stains yellow, and silver articles, as watches, jewelry, and money, coming in contact with the exhalations, are tarnished, a coating of silver sulphide being formed. When given to the mother sulphur may prove laxative to the suckling child. Excessive doses (2 drachms) given several times a day have produced a protracted irritation of the stomach, the disorder sometimes lasting for years. Two ounces, taken in a day, have caused fever, headache, contraction of the pupils, cold clammy sweat, vomiting, hæmaturia, semi-unconsciousness, and purging of bloody stools. When applied externally in large amounts to the broken skin or ulcers, and to large surfaces, it has been absorbed with unpleasant results. It should not be used where there is active fever or inflammation. Sulphur is eliminated largely as unchanged sulphur by the feces, but a considerable portion is converted into sulphides by the alkaline secretions of the intestines, hydrogen sulphide notably predominating. Some sulphates and organic compounds of sulphur, formed by oxidation in the blood, are eliminated in the urine.

Therapy.—*External.* Sulphur is a parasiticide and is the best known specific remedy for scabies. There are several methods of applying it, but the best is by anointing with sulphur ointment alone, or combinations of sulphur and other parasiticides. The following are good preparations: (1) ℞ Sulphur, ℥j; Potassium Carbonate, ℥ij; Adeps, q. s., ℥iv. Mix. Anoint the parts thoroughly at bedtime. (Locke.) (2) ℞ Lanolin, lb. j; Oil of Tar, fl℥j; Specific Medicine Veratrum, fl℥j; Sublimed Sulphur, q. s. Mix. Ft. Unguent. Apply for three successive nights, omit three nights, then apply again in the same order, preceding each application by a thorough bath (Webster). (3) ℞ Sulphur, ℥ij; Liquor Potassæ, gtt. xv; Betanaphthol, ℥j; Balsam of Peru, ℥j; Petrolatum, q. s., ℥iij. Mix. Sig.: Apply every third night after observing the following procedure: First, give a thorough soap and water, prolonged bath, soft soap preferred. Rub the skin vigorously with a Turkish towel so as to break up the burrows of the itch mite. Apply the ointment thoroughly. Do this at bedtime. In the morning take a cleansing bath and put on fresh underwear and clothing. Subject the bedclothes and the discarded clothing to a thorough washing and scalding. If the fabrics are such as cannot be washed, heat them thoroughly in an open oven or subject them to a thorough ironing with a hot iron. If the itching persists, repeat the process every third day. The male insect does not burrow and is readily killed; but it takes vigorous treatment to reach the female ascarus, hence the necessity for the prolonged and softening baths. Should the skin become inflamed, treatment must be suspended until the inflammation subsides. This method may be used with all of the ointments named, and our preference is the last-named preparation. The second preparation is also useful for eczema and psoriasis. Locke advised the following as a hair tonic, provided the hair bulbs are not dead: ℞ Washed Sulphur, ℥j; Oil of Bergamot, gtt. x. Triturate; add Glycerin, fl℥ij; Rose Water, q. s., fl℥xij. Mix. Sig.: Apply with a soft sponge once a day. As the odor of bergamot is somewhat objectionable the oil may be omitted, though it is in itself an admirable stimulant to the scalp. Sulphur ointments constitute the chief local applications for acne and comedones. Some object to them on account of the mechanical obstruction they cause. To obviate this Ellingwood suggests the alternate use of lotions of sulphur and of nitrate of potassium. A thorough face toilet of sulphur soap or tar soap is to be followed by rinsing with hot water and carefully drying with a soft cloth. Then apply a lotion of one drachm of washed sulphur in the morning and one of potassium nitrate in the evening, allowing them to dry on by evaporation. We have found steaming the face with hot towels, followed by cold affusion and a very mild sulphur ointment (sublimed sulphur, gr. xv to petrolatum, ℥j), to be very effectual in controlling stubborn acne. Ordinary sublimed sulphur is sometimes more effectual than washed sulphur, as some of the benefit undoubtedly comes from the impurities of the former. It appears to act best in acne associated with disorders of the female reproductive organs, and with sexual disturbances in the male.

Sulphur, locally, is employed mostly in scaly, pustular and vesicular types of skin diseases. The ointment (10 per cent) is preferred, though it should frequently be reduced to half strength. The disorders most benefited

by it, besides those mentioned previously, are echthyma, impetigo, and psoriasis. Insufflations of sulphur are sometimes curative in acute pharyngitis, and in ulcerative sore throat; while for its antiseptic effects and to hasten detachment of the false membrane it is occasionally used in diphtheria and in follicular tonsillitis.

Internal. Sulphur was at one time extensively used, but at the present day seems too often neglected. When a laxative is desired that will act without marked irritation or the production of excessive intestinal secretion, sulphur is one of the best that can be selected. No agent acts so well as a laxative in hemorrhoids, the stool produced being papescent and easily and plentifully voided. Again, when dry, hard and scybalous feces are an annoying feature, no aperient surpasses sulphur. In such disorders as stricture of the rectum or anal fissure it is absolutely necessary to modify the feces so that they may readily pass through the contracted outlet. For this purpose sulphur is invaluable. By strict adherence to regularity in attending to the toilet, with gentle urging, and the persistent use of small doses of sulphur for a short period, many cases of habitual constipation may be cured. It also provides a mild laxative for the constipation of pregnancy. Either washed or sublimed sulphur may be used.

Sulphur is undoubtedly a blood maker and a modifier of vicious states of the lymphatics. Its beneficial action is often obtained from the sulphides occurring naturally in foods, among the best and most wholesome of which are eggs and onions. Condiments such as mustard, horseradish, and radishes also contain them. They all tend to the more perfect elaboration of protein tissues. Most tuberculous subjects require sulphur in some form, and among the best of foods for such subjects are the sulphur-bearing eggs.

Individuals requiring sulphur medication in small doses have a blanched appearance of the skin, the iris and the hair fade, and in the middle-aged there is an early tendency to gray hair; the feces and urine are pale, and the latter contains cystine. If the mucous surfaces are bathed in a mucous flow and there are itching and burning, the stronger the indications for sulphur. If the secretions are fetid or cadaverous, and there is evident tendency to decomposition of the fluids and tissues, sulphur is necessary, and in small doses will greatly change the character of the disease of which these symptoms are a part. Again, if the bile is imperfectly elaborated, so that it fails to exert its antiseptic effect upon the intestinal contents, sulphur will be of great advantage in rectifying the difficulty.

With the foregoing guides before us, we find sulphur very valuable in headache due to cerebral fullness and associated with dizziness and ringing noises in the ears; in tendency to cracking or fissure behind the ears, at the angles of the mouth, and wings of the nose, so noticeable in ill-nourished and tuberculous children; in fissure at the anal outlet; in cracked nipples; and in amenorrhœa and other pelvic disorders of women, with imperfectly elaborated menses, the flow being semi-leucorrhœal; and in sexual frigidity of the female. It is also of much value in dyspepsia with heaviness after meals, bad taste, pyrosis, and associated either with obstinate constipation or tenesmic diarrhœa, with pale and offensive feces.

Sulphur is a most valuable but seldom considered remedy for cough, especially of the chronic type and that following la grippe or attending

phthisis. At one time large doses of sulphur were commonly used in coughs, but the inevitable disturbances in other directions brought on by such large amounts led to its abandonment for that purpose. Large doses, however, are not necessary nor, indeed, do they act as well as minute doses. In our own experience the 1 to 100 trituration in five to ten grains doses has proved most effectual, being a splendid form of treatment for cough with heavy and copious secretions and lack of power to expectorate. There is loud rattling of mucus within the chest, and when raised it is abundant, thick, heavy, yellowish or greenish, and sometimes very fetid. Sulphur should be exhibited in chronic bronchitis, fetid bronchitis, in the latter stages of whooping cough in those disposed to phthisis, and in the distressing cough of phthisis, with tenacious sputum.

Sulphur is sometimes of value in so-called chronic rheumatism. The sulphur-demanding state of the body above described will indicate when it should be used. The same may be said of its employment in skin diseases, both internally and locally, the types most benefited being those of a scaly, pustular, or vesicular character. It is sometimes of value in localized pain, such as the darting and tearing pains of acute rheumatism and neuralgia. For pain simulating the prick of a pin it is said to be specific.

SUMBUL.

The dried rhizome and roots of *Ferula Sumbul* (Kauffmann), Hooker filius (Nat. Ord. Umbelliferæ). Northeastern and central Asia, coming into market through Russia. *Dose*, 5 to 60 grains.

Common Names: Sumbul, Musk-Root, Jatamansi.

Principal Constituents.—A musk-odored volatile oil, aromatic resin, balsam, and angelic, valeric, and sumbulic acids.

Preparation.—*Fluidextractum Sumbul*, Fluidextract of Sumbul. *Dose*, 10 to 60 drops.

Action and Therapy.—Sumbul is a stimulating tonic to the nervous system, and for that purpose is employed chiefly with associated nervines, in asthenia and nervous depression. It is particularly adapted to neurasthenia and nervous exhaustion of anemic or chlorotic women to allay nervous unrest and impart tone. Many physicians employ it as a nerve-tonic and reconstructive in convalescence from prolonged illness.

SYMPHYTUM.

The root of *Symphytum officinale*, Linné (Nat. Ord. Boraginaceæ). Europe; naturalized in the United States.

Common Name: Comfrey.

Principal Constituents.—Mucilage in quantity, tannin and asparagine.

Preparation.—*Tinctura Symphyti*, Tincture of Symphytum (recent root, ℥viij; Alcohol, Oj). *Dose*, 1 to 10 drops.

Action and Therapy.—This drug is chiefly mucilaginous and used, therefore, as a demulcent in pulmonary, gastric, and renal irritation and inflammations. With many it is a favorite for irritative cough, with bloody expectoration; and in mucous disorders with a tendency to hemorrhage. In ancient days it was lauded as a vulnerary, even to promoting the quick healing of fractured bones, a myth that was more recently revived in England because of the discovery of a principle (allantoin) found in the plant.

SYRUPUS FERRI IODIDI.

Syrup of Ferrous Iodide, Syrup of Iodide of Iron.

Description.—Syrup of Iodide of Iron is a pale, yellowish-green, transparent fluid, having an acid reaction, and a sweet and pronouncedly ferruginous taste. Iodide of iron is an unstable salt, and sugar is its best preservative. This syrup sometimes becomes of a deep red color if kept in the dark. The pale green color may be restored by placing the bottle, well filled with the syrup, where the direct rays of the sun may fall upon it. *Dose*, 3 to 40 drops.

Action and Therapy.—Iodide of iron is powerfully alterative, tonic, and sometimes emmenagogue. It is best administered in the form of syrup, or full doses of twenty to thirty drops of the syrup may be given well diluted with water. If given in large doses it causes gastric irritation and is objectionable. It is a good agent in devitalized patients when an alterative and tonic is indicated. It is most largely used in patients with low vitality, glandular enlargements, and vicious secretions—especially in that near-tuberculous state denominated "scrofulous" or "strumous," for want of better names; and also where there is anemia dependent upon or associated with a syphilitic taint. Its influence is more that of iron than of iodine. It increases tone generally and improves the appetite and digestive power. That which is not assimilated is removed by the kidneys. It is a good medicine in the anemia of struma or of phthisis. It gives strength and increases the excretions very greatly. It is best given in these conditions with cod liver oil, provided either does not offend the stomach. Use twenty drops in teaspoonful of cod liver oil. This salt is very efficient in eczema with scrofulous enlargement of glands and great debility.

Iodide of iron rarely is useful in hydrocephalus. In dysmenorrhœa with anemia in females of a strumous diathesis, it relieves the pain and promotes the discharge. Leucorrhœa, in syphilitic and so-called scrofulous patients, is benefited by it. Give internally from fifteen to twenty drops of the syrup three times a day, and use locally a wash of solution of borax. In albuminuria it is sometimes a good remedy. It is also of much value in secondary syphilis, and appears to be of distinct advantage in rheumatoid arthritis. If given in alternation with some vegetable tonic, as gentian, hydrastis, berberis, or with alteratives, as phytolacca and iris, it exhibits its best action. Incontinence of urine in anemic children is relieved by it in doses of from five to ten drops three times a day. It has given fine results in chronic diseases of the liver, in strumous patients. It is one of the best remedies for pale, pasty-looking children with otorrhœa and other unhealthy discharges, associated with adenopathy.

Syrup of Iodide of Iron is an effective agent when of good quality. Should it become changed, through any cause, so as to liberate free iodine, then it becomes an irritant and should not be used. Such alteration is manifested by a change from the pale green color to various shades of red. As this syrup is largely used in disorders of children, particularly those of a strumous type, or showing persistent adenopathy, it is essential that only the best quality be used, for a large part of the success of treatment of such cases depends upon keeping the gastro-intestinal canal free from irritation and capable of the most complete and easy digestion of foods. In fact, malnutrition is to be feared more than anything in these children, and great care should be had to avoid "iodine punishment." Should this occur the medicine should be withheld for a time and be begun anew in very small doses. Sometimes the administration of the syrup immediately following a meal will obviate such a disturbance.

TALCUM PURIFICATUM.

Purified Talc, French Chalk, Soapstone.

Purified hydrous magnesium silicate, with sometimes a small quantity of the corresponding aluminum salt.

Description.—A very fine, odorless and tasteless, white or grayish-white powder, of slippery feel, free from grittiness and adhering to the skin.

Action and Therapy.—Talc is soothing to irritated and chafed surfaces, and in dermatitis and herpes zoster. It is an ingredient of dusting powders.

TANACETUM.

The leaves and tops of *Tanacetum vulgare*, Linné (Nat. Ord. Compositæ). Europe; naturalized and cultivated in the United States. *Dose*, 5 to 60 grains.

Common Name: Tansy.

Principal Constituents.—A volatile oil (*Oleum Tanaceti*), and an amorphous, bitter *tanacetin*.

Preparations.—1. *Oleum Tanaceti*, Oil of Tansy. *Dose*, 1 to 10 drops.

2. *Tinctura Tanaceti*, Tincture of Tanacetum (fresh herb, ℥viij, to Alcohol, 76 per cent). *Dose*, 1 to 30 drops.

Action and Toxicology.—Oil of tansy is a gastro-intestinal and nerve poison, and in overdoses has caused epileptiform convulsions, profound coma, and death by paralysis of the breathing organs (asphyxiation). Lesser doses may increase the pulse rate, dilate the pupils, and cause severe vomiting and purging with colicky pain. Doses above fifteen drops are dangerous. Most deaths have occurred from its use in attempts at abortion.

Therapy.—*External.* In use in domestic medicine as a fomentation to sprains and injuries, and to the abdomen in dysmenorrhœa.

Internal. Tansy is a uterine stimulant and emmenagogue, and is a popular but unsafe remedy to restore arrested or delayed menstruation. An infusion is generally employed for this purpose by the laity. The cold infusion and the tincture (℥viij to Alcohol, Oj; dose, 5 to 10 drops) are sometimes useful as a gastric bitter in convalescence from exhausting diseases and in dyspeptic conditions with flatulence.

TARAXACUM.

The root of *Taraxacum officinale*, Weber, gathered in the autumn (Nat. Ord. Compositæ). Native of Greece and a wayside weed in Europe and the United States. *Dose*, 5 to 60 grains.

Common Name: Dandelion.

Principal Constituents.—*Inulin*, sugar, *lævulin*, and an amorphous, bitter *taraxacin*.

Preparation.—*Specific Medicine Taraxacum. Dose*, 1 to 60 drops.

Specific Indications.—Anorexia, weak digestion, hepatic torpor, and constipation.

Action and Therapy.—If prepared from recent root, taraxacum preparations may be classed with the simple bitters, having in addition a slight laxative, diuretic and alterative action. In association with other indicated remedies they may be used in catarrhal jaundice, with hepatic torpor, chronic constipation, and in catarrhal gastritis; also as a laxative-alterative in autointoxications giving rise to skin disorders and aphthous ulcers. It is contraindicated in weak and irritable or inflammatory conditions of the

stomach and bowels, causing flatulence, pain, indigestion, and diarrhœa. The best preparation is an extract of the fresh root.

TELA ARANEÆ.

The freshly spun web, free from dust, of the *Tegenaria domestica*, or common house spider, or as often employed in this country, the web of *Tegenaria medicinalis*, or field spider. Division: Homogangliata; Class: Arachnida.

Common Names: Spider's Web, Cobweb.

Preparation.—*Specific Medicine Tela Araneæ. Dose*, 1 to 10 drops.

Specific Indications.—"Debilitated subjects of neurotic tendency, with cool, clammy skin, protracted sensation of chilliness, with or without nervous complication, especially where periodicity is in evidence. Given when the keynote, chilliness, long-continued, is present, it is liable to remove accompanying neurotic complications, at the same time that it corrects the faulty condition of the circulation" (Webster).

Therapy.—This is one of the very few animal substances that has found its way into Eclectic therapy, apis being the most noteworthy. When considered in the light of present-day craze for animal secretion medication the record pales by comparison. This use has been borrowed from Homœopathy, though the spider-web has long figured in domestic medicine, being given in pill-form for intermittent fevers. That tela has power is not to be questioned. It is probably a heart, vaso-motor and nerve stimulant and an antiperiodic. Munk declares it indicated by "a persistent feeling of cold that is usually accompanied by weakness and often by nervousness", while Webster gives "continual chilliness, unable to get warm by the aid of proper clothing, apartment or fuel, emphasized if the skin is continually cool and clammy, and if the chilliness is quickly aggravated by dampness." The therapy of tela is almost wholly based upon the extravagant report of Pierce (*E. M. J.*, 1886) who considered it specifically indicated by "masked periodical diseases in hectic, broken-down patients; in all diseases that come up suddenly with cool, clammy skin and perspiration, and cool extremities; in nocturnal orgasm in either sex; numbness of the extremities when sitting still or lying down. It relieves spasms of the arterioles and stimulates capillary circulation. It relieves hyperæsthesia of the cerebro-spinal nerves and the great sympathetic that depends upon debility. It is the greatest heart stimulant in the materia medica, and lobelia is only second to it." In spite of these claims the agent has never become popular or much employed in Eclectic medicine.

TEREBENUM.

Terebene.

A liquid composed of dipentene and pinene and other hydrocarbons.

Description.—A thin colorless liquid of thyme-like odor, and aromatic, turpentine-like taste; soluble in alcohol, and almost insoluble in water. It should be kept cool, tightly stoppered, and protected from light, so as not to become acid and resinified. *Dose*, 1 to 6 minims.

Action and Therapy.—*External.* Locally terebene has been used successfully as a deodorant and protective dressing for wounds, ulcers, and scalds and burns. It appears to promote rapid healing. Full strength terebene, or dilutions with olive oil (1 to 5 or 6), may be applied.

Internal. Terebene is germicide, antiseptic, deodorant, diuretic, and expectorant. It stimulates the bronchial tract and kidneys after the manner of the essential oils and renders their secretions antiseptic. It kills the yeast plant and renders vaccine virus inoccuous. Its chief use is that proposed by Murrell—a remedy for "winter cough," and the secondary stage of chronic bronchitis; also of some value in emphysema and the cough of consumptives. In all of the forms of cough it is indicated when the expectoration is profuse and malodorous. When flatulence is due to yeasty fermentation, terebene sometimes relieves it. It may be administered in capsules, on sugar, in emulsion, or with other expectorant mixtures. From three to fifteen minims may be given three times a day, the usual dose being from four to six minims.

TERPINI HYDRAS.

Terpin Hydrate. (Formula: $C_{10}H_{18}(OH)_2+H_2O$.)
The hydrate of the dihydric alcohol terpin.

Description.—Colorless and nearly odorless, shining crystals, having a feebly aromatic and bitterish taste. In dry air it loses water of crystallization. Soluble in alcohol, ether, chloroform, and water. *Dose*, 1 to 4 grains.

Action and Therapy.—Terpin hydrate acts upon the bronchial and renal tracts as an antiseptic expectorant and diuretic. It is employed chiefly in chronic bronchitis with oversecretion. Like the turpentines, it will relieve intestinal meteorism and assist in dispelling flatus. Overdoses cause renal congestion, strangury, hematuria, and albuminuria. Rarely it is of service in gleet and chronic cystitis. It is reputed useful as a palliative in both whooping cough and hay fever (full dose). The dose is from one to four grains, three times a day. As high as fifteen or twenty grains is advised by Hare in hay fever. The best forms of administration are in capsule, aromatized alcoholic solution, or in alcoholics with flavored syrups.

THYMOL.

Thymic Acid. (Formula: $C_{10}H_{14}O$.)
A phenol occurring in the volatile oils of *Thymus vulgaris*, Linné; *Monarda punctata*, Linné (Nat. Ord. Labiatæ), and *Carum Ajowan* (Roxburgh), Bentham et Hooker (Nat. Ord. Umbelliferæ), and other plants.

Description.—Large, colorless, translucent crystals, having an aromatic thymous odor, and a pungent, aromatic taste. It has a very slight caustic effect upon the lips. Very soluble in alcohol, chloroform, ether, and olive oil; and soluble in other fixed and volatile oils. It is sparingly soluble in water, about 1 in 1010 parts. Triturated with about an equal quantity of camphor or chloral it liquefies. *Dose*, 1 to 3 grains (antiseptic); 10 to 20 grains (anthelmintic); usual dose, 15 grains.

Specific Indications.—Hookworm; chyluria of filarious origin.

Action and Toxicology.—Thymol somewhat resembles phenol (carbolic acid) in action and was introduced as a substitute for that agent. Its present high price militates against its very general employment. Thymol is antiseptic, deodorant, and disinfectant. It destroys the vitality of living and organized ferments, and prevents and arrests putrefaction. A few grains will preserve milk and urine, and some other animal substances, for weeks without change. It completely deodorizes pus and has a drying effect upon ulcers to which it may be applied. Its expensiveness precludes its use for disinfection of rooms and garments; and its usefulness is said to be

offset in a measure by its attraction for the common housefly, which appears to be very fond of it. Upon the mouth it produces a sharp pricking sensation, and has a disagreeable taste. Gastric warmth, rarely vomiting, and sometimes diarrhœa are caused by it. Profuse sweating is occasioned by it and it reduces temperature, but is not a safe antipyretic. The kidneys are more readily damaged by it than by phenol, and the urine becomes dark or greenish in color or may contain albumen or blood, signals to immediately stop the use of the drug. Its elimination, partly changed and partly unchanged, is through the renal organs—thymol, hydroquinone, glycouronic and sulphuric acids being found in the urine. Hare states that toxic symptoms do not take place from less than one hundred grains of thymol taken in a day.

Therapy.—*External.* As a deodorant, antiseptic and antiparasitic, thymol is useful, in solution or ointment, for certain skin disorders, as ringworm and pityriasis versicolor (1 in 10 of alcohol) and in psoriasis, acne, alopecia, eczema, etc. (ointment, 1 to 60). A thick concentrated solution may be inhaled through a glass tube in diphtheria, pulmonary tuberculosis, bronchiectasis and gangrene of the lung to remove stench and sedate cough. Solutions of various strength, up to one in three hundred or in combination with other desirable agents, are much in use as a mouth and throat wash and douche for nasal catarrh. For these purposes it is especially stimulating and deodorant; and it is occasionally incorporated into dentifrices. Glycothymoline, a proprietary preparation, is an especially valuable alkaline and antiseptic detergent.

Internal. Thymol is the best remedy yet found for the American hookworm (*Uncinaria americana*). It should be given in capsules or in konseals, and never in any substance in which it is soluble. Therefore no oils, fats, alcohol, chloroform, ether, should be used, and as little water as possible ingested during treatment. This confines the effects locally to the nidus of the parasite, and prevents poisoning by absorption. Fatty foods should be avoided, and alkalies should be withheld. A purge should be given, preferably Epsom salt; ten hours later fifteen to twenty grains of thymol for an adult or seven grains for a child should be administered, followed in three or four hours by another cathartic dose of the salt, or if preferred, a dose of senna. It may be necessary to repeat treatment about once a week as long as any nematodes are present. Webster has recorded success from the use of thymol in tapeworm, and others have advised it for chyluria of filarious origin. Thymol is occasionally useful in catarrh of the stomach and bowels to arrest fermentation and provoke increased digestive activity.

THYMOLIS IODIDUM.

Thymol Iodide, Aristol, Dithymol-Diiodide.

A product of the interaction of thymol and iodine in the presence of solutions of iodide of potassium and of sodium hydroxide. (Formula: $C_{20}H_{24}O_2I_2$.)

Description.—A bulky, reddish-brown or reddish-yellow powder, slightly aromatic. Readily soluble in ether, chloroform, collodion, and oils; sparingly soluble in alcohol, and insoluble in water and glycerin. It should contain not less than 43 per cent of iodine. It should be kept in amber-colored bottles.

Action and Therapy.—*External.* Aristol is anodyne and dessicant. In action it more nearly resembles phenol than iodoform, for which it is used

as a substitute. Its applications are practically the same as those for iodoform, but it must not be applied upon wounds and ulcers when there are free secretions, for under such conditions, probably through decomposition, it increases the moisture. It has, however, given good results in acute and chronic suppurative otitis media and moist eczema of the aural canal. It has also been advised in powder and ointment, in interstitial and phlyctenular keratitis. Like iodoform it may be used upon syphilitic sores and to relieve anal distress in painful hemorrhoids, fissures, and in tuberculosis and cancer of the rectum.

THYROIDEUM SICCUM.

Dried Thyroids, Dessicated Thyroid Glands (Glandulæ Thyroideæ Siccæ).

The dried and powdered fat and fascia-free thyroid glands of animals used for food, especially those of the sheep. They should contain no iodine or iodine compounds other than that which is a natural part of the normal secretions; the limit placed by the U. S. P. being not less than 0.17 per cent nor more than 0.23 per cent of iodine.

Description.—A non-crystalline, yellowish powder, having a slight but peculiar taste. *Dose*, 1 to 3 grains. (Average dose, 1 1/2 grains.)

Action.—Thyroid gland, either fresh or dried, is a true stimulator of metabolism and exerts a powerful effect upon the processes of nutrition, either for good or evil. This it does by furnishing a form of iodine peculiar to the gland itself.

Thyroid gland causes a rapid loss of weight, due to increased protein waste and augmented diuresis. In overdoses or when inaptly employed it produces many unpleasant symptoms, even to the extent of poisoning (*thyroidism*). In obese subjects it is apt to induce glycosuria, on account of causing a derangement of the glycogenic function of the liver. Untoward effects also include tachycardia, with marked nervousness and tremors, flushing of the skin, headache of a congestive type, sweating, profuse urination, loss of appetite, diarrhœa, fugitive pains, lassitude, and marked loss of flesh.

Therapy.—Thyroid gland has given the most striking results in diseases showing a deficiency of iodine and other glandular products of the thyroid of the human being, probably *thyreoglobulin*. It is most decidedly effective in myxœdema (thyroid atrophy in adults) and cretinism, and in well-determined forms of hypothyroidism. Where the thyroids of the human subject have been removed, thus depriving the body of the influence of the thyroid secretion, it has been administered with the result of modifying the many symptoms resulting from such deprivation. This condition is termed *cachexia thyreopriva*.

As a rule thyroid treatment is contraindicated in ordinary goitre, though occasionally small doses have proved useful in some cases. These are assumed to be those in which the changes in the gland are passing from hyperplasia (thickening of connective stroma) into atrophy, or where, through crowding by enlargement of tissue upon the colloid cell-contents, secretion of iodine and thyreoglobin is interfered with. Even in myxœdema care must be had not to overdose lest symptoms comparable to thyroidism be induced. As a rule, one grain doses, three times a day, are employed and continued indefinitely as long as good results. In cretinism (congenital absence or atrophy of the thyroid) and in cachexia thyreopriva

(extracted thyroids) it is necessary to give it throughout the patient's lifetime. Notwithstanding its power to reduce weight it should not be used as a remedy for obesity, for which it has sometimes been advised, and in which it has induced sugar diabetes, nor is it of value, except rarely, in exophthalmic goitre, a very different affection from that of other thyroid involvements. Various extracts, as *thyroidin*, have been used, but all are less effective than the dried glands.

THUJA.

The branchlets and leaves of *Thuja occidentalis*, Linné (Nat. Ord. Coniferæ). Indigenous to Canada and the United States, on the rocky borders of streams and lakes, and in swamps.

Common Names: Arbor Vitæ, Yellow Cedar, False White Cedar, Tree of Life.

Principal Constituents.—*Oleum Thujæ* (Oil of Arbor Vitæ), having a camphoraceous odor and tansy-like taste, and composed of dextro-pinene, lævo-fenchone, and dextro-thujone; a bitter glucoside, *pinipicrin*, and thujin ($C_{20}H_{22}O_{12}$), an astringent, yellow glucoside closely related to quercitrin.

Preparations.—1. *Specific Medicine Thuja. Dose*, 1 to 30 drops.
2. *Aqueous Thuja. Dose*, 1 to 40 drops; chiefly used locally.
3. *Long's Thuja*, An Ointment of Thuja.

Specific Indications.—Vesical irritation and atony; enuresis due to atony; urinal incontinence in children due to a weak bladder; dribbling of the urine in the aged, not due to paralysis or growths; urine expelled upon exertion as coughing, etc.; catarrhal flow from bladder or genitalia of male or female; chronic prostatitis; warty excrescences, and dry forms of eczema. Locally: fissured anus, prolapsus ani, pruritus in mucous membranes; venereal discharges; trachoma; warts; nævi; urethral caruncles; and hydrocele.

Action.—In small doses thuja is tonic and increases the activities of the kidneys. Large doses may provoke the irritant effects common to the turpentines and balsams. It has been asserted to have caused abortion, a doubtful effect, but attributed secondarily to violent gastric and intestinal irritation, resulting from excessive amounts of the drug. In many respects it resembles the activities of savin; though unlike the latter it is not a poison.

Therapy.—*External.* Locally thuja is stimulant, subastringent, deodorant and antiseptic. It is especially useful for the restraint and reduction of hypertrophic changes in the mucous and cutaneous tissues. It will deaden and repress fungous granulations, and for this purpose may be applied to "proud flesh" and "ingrown nail" (both overgrown granulations). Alcoholic preparations of thuja may be employed to retard fungoid granulation and ulceration in epithelioma (does not cure), bed sores, sloughing wounds, fistulæ, and to overcome the stench of senile and other forms of gangrene. It has a good record in curing papillomata and condylomata (upon the nates) when soft and there is foul exudation; and often succeeds in controlling venereal or genital warts. Alcoholic preparations of thuja are generally conceded to be the best local and kindly acting vegetable medicines for the dispersal of common warts or verruccæ on any part of the body. It is applied locally and with reputed greater success hypodermatically into the base of the growth. Our personal experience with it for the removal of warts has been negative. Rarely it controls bleeding and ameliorates in

hemorrhoids and prolapsus ani. Persisted in, though at first painful, it has cured fissure of the anus. Howe valued it for bulging nævi, and his once famous method of curing hydrocele with it is now little practiced. As compared with tincture of iodine or with carbolic acid it is less painful, but unlike the latter free from poisonous consequences through absorption. Howe's method was as follows: Tap and drain the tunica vaginalis testis, and inject two drachms of a solution of specific medicine thuja (one part) in warm sterile water (seven parts). Knead the tissues thoroughly so that the fluid is made to penetrate every part of the sac. More or less burning pain ensues, together with a greater or less degree of swelling; after subsidence of the latter, if the procedure has been carefully executed, adhesion of the contact surfaces from the inflammation provoked results. Specific medicine thuja has been used to remove urethral caruncle and for the relief of chronic dry eczema of a furfuraceous character. Dropped upon hot water and inhaled it is of benefit in fetid sore throat, chronic and fetid bronchitis, bronchorrhœa, and chronic nasal and retro-nasal catarrh. In all of the foregoing conditions the alcoholic preparations may be employed from full strength to such a dilution as the individual cases demand.

Aqueous thuja is invaluable to relieve pain and promote quick healing in soft pultaceous chancroids. It quickly allays pain, checks the discharge and odor, prevents lymphatic engorgement, and stimulates healing. It has no effect upon hard chancre, nor is it in any sense to be regarded as antisyphilitic. Wherever upon sensitive tissues the alcoholic preparations are inadvisable, the aqueous preparation may be substituted. It has been especially useful in catarrhal granulation of the cervix uteri (tampon); its use being preceded by a hot douche. For acute gonorrhœa the following injection is most valuable: ℞ Colorless Hydrastis; Aqueous Thuja, aa, 1 part; Warm Water, 4 parts. Mix. Sig.: Inject every three hours. If there is much soreness add one part of Specific Medicine Hamamelis. The same mixture gives good results in subacute and chronic proctitis, following dysentery. Locally applied alone, or in the above-named combination, it may be used upon balanitis, herpetic ulcers, and abrasions and excoriations of the glans penis. As a local wash for mucous erosions in the mouth, for sore nipples, and for chapped hands it is pleasant and often efficient.

Ointment of Thuja is the preferred thuja preparation for granular ophthalmia or simple trachoma. When the granules are soft and pultaceous a wetted alum pencil may be quickly passed over the everted lid, making but one sweep at each treatment. The parts are then dried, especially if the subconjunctival tissue is much infiltrated; and the ointment applied by means of a camel's-hair pencil. This should be done once a day. Fleeting pain is experienced. Absolute cleanliness should be insisted upon when home treatment is carried out, and constitutional remedies administered when conditions warrant them.

Internal. Thuja is stimulant, subastringent, and antiseptic. Internally its effects resemble those of the terebinths, particularly savin, though it is less energetic than the latter. It is employed chiefly for its effects upon the mucous tracts—particularly the broncho-pulmonic and genito-urinary. While it has been advised (by inhalation from hot water) for hemoptysis, we have far better agents for this purpose; but in bronchial affections with

excessive and fetid expectoration it is of considerable value and ranks well with other terebinthinates. Its most specific action is upon the bladder controlling urinal incontinence in all forms except those excited by urinary concretions, paretic conditions, worms, or malignant growths. A most marked effect for good comes from its use for the relief of dribbling of urine in the aged and the young, provided paralysis does not exist in the former, or preputial adhesion or phymosis is not present in the latter. Doses of five to ten drops of the specific medicine often relieve nocturnal enuresis in children, when merely functional. Lack of tone in the muscularis mucosæ appears to be the indication for it. The bladder seems too weak to prevent leakage, and for this debility it is especially useful when coughing or straining at stool, or the lifting of weighty objects causes an expulsion of urine. The doses mentioned also aid the local use of aqueous thuja in gleet when accompanied by granular urethritis. In habitual bed wetting the following is sometimes more effectual than thuja alone: ℞ Specific Medicine Thuja, gtt. xxx; Specific Medicine Belladonna, gtt. xx; Water, q. s., fl℥iv. Mix. Sig.: One teaspoonful four times a day. Thuja gives comfort and relief in that unfortunate condition in old men with enlarged prostate in which the urine constantly dribbles, entailing much discomfort and misery, and producing unsightly stains upon the clothing. Whether it has any power to reduce an enlarged prostate has not been determined, but that it relieves weakness of the neck of the bladder is well established. Some claim that thuja is especially serviceable in cystic irritability when associated with eczema or with gout. Like most products of the conifers, thuja sometimes proves emmenagogue and stimulates in atonic amenorrhœa when the genital tissues are flabby and lifeless.

TINCTURA FERRI ACETATIS.

Tincture of Acetate of Iron.

Description.—A transparent, claret-colored tincture having a strong chalybeate taste. *Dose*, 1 to 30 drops, well diluted.

Specific Indications.—Pale, transparent skin, with prominent blue veins; dull, heavy pain in the back of the head; bluish color of tissues.

Action and Therapy.—Tonic, astringent, and hemostatic. A very useful form of iron for internal administration in the anemia following adynamic fevers, and in anemic women with watery leucorrhœa, when the indications given above are observed.

TINCTURA FERRI CHLORIDI.

Tincture of Ferric Chloride, Tincture of Chloride of Iron, Tincture of Iron, Tincture of Muriate of Iron, Muriated Tincture of Iron.

Description.—A hydro-alcoholic solution of Ferric Chloride. It contains about 13 per cent. A very astringent, styptic liquid of a bright amber color, an acid reaction, and a slight ethereal odor. It should be made at least three months before using and be protected from light. *Dose*, 5 to 20 drops.

Specific Indications.—Chlorosis and anemia; erysipelatous redness, with glistening surfaces, deep redness of mucous tissues, approaching a solid blue in color; dull pain in the back of the head; swollen reddened tissues.

Action and Therapy.—*External.* Tincture of chloride of iron full strength, or if too painful, slightly diluted with water, is a most valuable

astringent destroyer of chancre. This use of it was introduced by King, and has fallen into unmerited neglect. In stubborn phagedenic chancre it has surpassed any other medicament we have applied, and its use in this manner is absolutely without poisonous absorption or unpleasant after-effects such as follow many more powerful applications. It does not cure syphilis, however, and proper antisyphilitic measures must be pursued, even though all local trace of the infection has disappeared. Equal parts of glycerin and tincture of iron is the best local application in most cases of erysipelas, and the same diluted with water to 25 per cent strength is efficient upon tonsillar inflammations and diphtheritic deposits, or the tincture may be used in simple solution in water as a gargle. Locke advised a 25 per cent glycerin solution in erysipelas. Diluted with water, tincture of iron may be used as a dressing for sluggish ulcers and to reduce excessive granulations. A 5 per cent wash of tincture of chloride of iron is an effectual application to check the inflammation in rhus poisoning and hasten desquamation. Applied full strength it removes venereal warts.

Internal. Tincture of chloride of iron is tonic, alterative, diuretic, astringent, and restorative. (For the general uses of iron, see *Ferrum.*) This agent is one of the strongest of the iron preparations, and is to be used chiefly in atonic conditions. Large doses of it are apt to disorder the stomach. However, it has been shown that small doses of chalybeates are preferable to large doses. In administering this agent, it is well to give it through a glass tube, avoiding, as much as possible, contact with the teeth, and afterward rinsing the mouth with sodium bicarbonate solution, unless a local effect upon the tissues of the mouth and throat is the object sought.

The specific indications should be closely followed to give good results. The deep-red coloration of mucous tissues, and deep-red color in local diseases, are the direct indications to its use. Sometimes the coloration is so deep as to appear a solid blue, and there may be dull pain in the back of the head. When the trouble is located in the mucous tissues, as in diphtheria and other disorders, the local manifestations of which are in the mouth or throat, the tongue, fauces, and pharyngeal vault are somewhat full, and have a deep-red, glistening, erysipelatoid appearance. Tincture of chloride of iron has long been given as the most satisfactory drug in anemia, and the train of disorders depending upon such a condition. It is particularly valuable in the anemia following the great loss of blood, the quality of the blood not being specially impaired, but the quantity deficient. It is also of great value when anemia is progressive, and due to alteration in the red blood corpuscles, or when the result of prolonged disease. It is one of the most valuable chalybeates in chlorotic anemia. As a tonic, one guided by the specific indications will find it very useful in struma, rachitis, tabes mesenterica, extensive ulcerative or suppurative processes, with colliquative sweating and hectic fever, tabes dorsalis, asthenic dropsies, from loss of blood, and in amenorrhœa, with anemia. In leucorrhœa, with anemia, gonorrhœa (latter stages), gleet, retention of urine from spasmodic stricture (10 drops, frequently repeated), chronic mucous discharges from the urinary organs, dysuria, irritability of the bladder, in females especially, polyuria, and in the diarrhœa of phthisis and low forms of fevers it is a useful drug. The dose in these disorders should be from ten to twenty drops, in plenty of water, two or three times a day.

The most direct specific results from this agent have been obtained in the treatment of erysipelas. It is not the remedy for all cases, but for those showing a deep-red, glistening surface, and having but a moderate amount of burning, and showing deep-redness of tongue. It reduces fever, allays pain and inflammation, increases the urinary flow, cleans the tongue, and gives rest. From five to thirty drops, well diluted, should be given every one-half hour, and the surface should be painted with the pure tincture, or the tincture diluted with glycerin (Scudder). Locke advises the following for local use: ℞ Tincture of Chloride of Iron, fℨss; Glycerin, fℨjss. Mix. Paint upon the parts and cover with cotton. (See page 680.)

Tincture of iron is of value in passive hemorrhage from bladder and kidneys (5 drops every 3 hours). It has been employed in post-partum hemorrhage, but is not equal to ergot and cinnamon. In phthisis, it checks hemorrhage, diarrhœa, profuse expectoration, and lessens night sweats. In chronic dysentery and chronic cholera infantum, with marked relaxation, it has sometimes proved serviceable. It occasionally relieves the dysmenorrhœa of anemic subjects. As a general tonic, after severe gastric, nervous, malarial, or other debilitating diseases, the following has been advised by Ellingwood: ℞ Tincture of Chloride of Iron, fℨiii; Diluted Phosphoric Acid, fℨiv; Glycerin, fℨi; Simple Elixir, q. s. fℨiii. Mix. Sig.: One teaspoonful, in water, every two or three hours.

In urinary affections, tincture of iron is frequently combined with uva ursi, buchu, or rarely with opium. In pyelitis, it lessens the quantity of pus, and, by its diuretic action, tends to lessen the danger of dropsy. In chronic nephritis, with albuminuria, it is one of the most important remedies, as it is in the latter stage of scarlatina, with albumen in the urine. It acts as a diuretic and reduces the output of albumen. In genito-urinary disorders, it is contraindicated, as a rule, by *active* inflammation. Some prefer the ethereal tincture in renal disorders, the dose of which is much smaller (3 to 5 drops).

In chronic ague, tincture of iron may be given in conjunction with antiperiodics, if anemia is present. Tincture of iron has long been regarded as an efficient aid in the treatment of diphtheria. The tissues are swollen and deep-red. It may be combined as follows: ℞ Tincture of Chloride of Iron, fℨj; Potassium Chlorate, gr. xv; Water, fℨii. From one-half to one teaspoonful, every two hours, according to age of child. A gargle of the diluted tincture may be used at the same time (see page 680). Tincture of iron is frequently of service in disorders produced by the absorption of septic material. It sustains strength, and is often antagonistic to the poison.

TRIFOLIUM.

The blossoms of *Trifolium pratense*, Linné (Nat. Ord. Leguminosæ). Cultivated everywhere.

Common Name: Red Clover.

Principal Constituents.—Resins and Tannin.

Preparation.—*Specific Medicine Trifolium. Dose*, 1 to 60 drops.

Specific Indications.—Irritability of the respiratory passages, with dry, explosive cough; carcinomatous cachexia.

Action and Therapy.—Trifolium is alterative and antispasmodic. It

relieves irritability of the respiratory tract, alleviating dry, irritable and spasmodic cough. Whooping cough is especially moderated by it, and it is frequently effective in lessening the distressing cough of measles, though in both disorders it fails as often as it succeeds. It also modifies cough in bronchitis and laryngitis. Its alterative powers are underrated, and it should be given where a general deobstruent effect is desired in chronic skin diseases, and unquestionably has a retarding effect upon malignant neoplasms. Though by no means curative in carcinoma, patients who have been operated upon for cancer are slower in redeveloping the growths when given tincture of trifolium daily.

TRINITROPHENOL.

Trinitrophenol, Picric Acid, Carbazotic Acid. (Formula: $C_6H_3(NO_2)_3OH$.)

A product of the interaction of phenol-sulphonic and nitric acids.

Description.—Light-yellow crystals or scales, without odor. Intensely bitter taste. It is sparingly dissolved by water, but is freely soluble in alcohol and ether. Used chiefly in the arts as a dye. It is explosive under rapid heat or percussion.

Action and Therapy.—*External.* Picric Acid stains the skin and sometimes produces an erythematous rash. It has been suggested as sometimes useful in 1 per cent solution as an application for herpes zoster and acute eczema, and as an injection (1 part to 100 or 200 parts of water) in the second stage of gonorrhœa. Its chief use, however, is that of an external application for the relief of burns and scalds of the first and second degree, when the area burned is small. It should not be used over large areas, nor where burns are deep, nor when there is known existence of renal irritation. Poisonous absorption may occur under such conditions. In applying it to burns all charred clothing, débris and dirt should be removed, the blisters pricked, and sterilized gauze saturated with a 1 per cent picric acid solution applied, covered with cotton, and lightly bandaged. This application, which dries quickly, is left in place for a few days, when a new application is applied for a week or so, having removed the first dressing by moistening it with the picric acid solution. Suppuration does not readily occur, healing is prompt, and little or no scarring results. The dressing causes some pain when first applied, but this quickly subsides. The cleanliness of this method is an argument in its favor. Rubber gloves should be worn by the physician or attendant while applying this agent; and the stain it produces may be removed with solution of lithium carbonate (℥j to Water, Oj). Bethea gives the following formula for this dressing: ℞ Trinitrophenolis, gr. xj; Alcoholis, fl℥iv; Aquæ Dest. q. s., fl℥viij. Sig.: Use as a wet dressing as directed. A saturated solution of picric acid is a delicate test for albumen in the urine.

TRITICUM.

The dried rhizome and roots of *Agropyron repens* (Linné), Beauvois (*Triticum repens*, Linné); (Nat. Ord. Gramineæ). A native of Europe and naturalized in the United States, where it has become a nuisance. *Dose*, 120 to 240 grains.

Common Names: Couch-Grass, Quick-Grass, Quitch, Dog-Grass.

Principal Constituents.—A hygroscopic, gummy, inulin-like principle, *triticin* (8 to 11 per cent), *lævulose* (2 to 4 per cent), and acid malates.

Preparations.—1. *Infusum Tritici*, Infusion of Triticum (Triticum, ℥j; Water, Oj. Infuse one hour.) *Dose*, 2 to 4 fluidounces several times a day.

2. *Specific Medicine Triticum. Dose*, 1 to 60 drops.

Specific Indications.—Irritation of urinary passages; pain in the back; frequent and difficult or painful urination; gravel; discharges of mucus and blood from the urethra.

Action and Therapy.—A mild diuretic with slightly aperient properties, and a demulcent of value in irritated conditions of the genito-urinary organs. It is of special value to lessen the frequency and pain of urination—a remedy for dysuria and strangury. It may be used when inflammation is present, and is highly valued in chronic cystic irritability, cystitis, pyelitis, incipient nephritis, prostatitis, and in any condition in which an excess of mucus, pus, or blood is passed in the urine. Indirectly it acts as an alterative by washing away broken-down material by way of the renal organs.

TUSSILAGO.

The leaves and flowers of *Tussilago Farfara*, Linné (Nat. Ord. Compositæ). Europe, Asia, East Indies, and the United States. *Dose*, 10 to 120 grains.

Common Name: Coltsfoot.

Principal Constituents.—Acrid volatile oil, a bitter glucoside, resin, tannin, *saponin* and mucilage (3 to 4 per cent).

Preparation.—*Infusum Tussilago*, Infusion of Tussilago. *Dose*, 1 to 4 fluidounces.

Action and Therapy.—A demulcent to allay irritation of the bronchial and gastric mucous membrane, and of considerable value in coughs, laryngitis, bronchitis, asthma, pharyngitis, whooping cough, and gastric and intestinal catarrh. A coltsfoot candy is a popular confection for cough and sore throat.

ULMUS.

The dried, inner bark of *Ulmus fulva*, Michaux (Nat. Ord. Ulmaceæ). Eastern half of the United States, in woods.

Common Names: Slippery Elm, Elm, Elm Bark.

Principal Constituents.—Chiefly mucilage.

Preparation.—*Mucilago Ulmi*, Mucilage of Elm. *Dose, Ad libitum.*

Action and Therapy.—*External.* Elm bark forms a good emollient poultice of lighter weight than many others and is useful where such applications are permitted, as upon inflamed surfaces, hemorrhoids, and forming abscesses. As a rule, poultices should not be applied to open surfaces.

Internal. Elm bark is nutritive and demulcent. A mucilage of elm of good quality should be prepared with very cold water. Take shredded elm bark, bundle the shreds together after the manner of making a whisk broom, by tying one end with a long string. Suspend the bundle of bark in a vessel of ice water, from a support placed across the top of the container. A thick, ropy, mucilaginous preparation will result which is far more serviceable than those prepared on a water bath, the common method of preparing mucilage of elm.

Mucilage of elm is a splendid demulcent for irritable and irritated or inflamed mucous membranes, and to relieve dryness of the tissues of the mouth and throat, and to alleviate cough. It is one of the best agents to use after poisoning by irritants, to allay the distress and protect the inflamed tissues.

URTICA.

The leaves and root of *Urtica dioica*, Linné (Nat. Ord. Urticaceæ). Common in Europe and the United States. *Dose*, 20 to 40 grains.

Common Names: Nettle, Stinging Nettle.

Principal Constituents.—A volatile oil, tannic and gallic acids, and probably formic acid.

Preparation.—*Specific Medicine Urtica. Dose*, 1/2 to 20 drops.

Specific Indications.—Excessive mucous discharges; choleraic discharges; profuse gastric secretion, with eructations and vomiting; eczema of infants.

Action and Therapy.—*External.* Contact with growing nettle produces an intense stinging, probably due to an unorganized ferment in the hairs of the plant, though by some formic acid is believed to be the irritating substance. A lotion of Specific Medicine Urtica, fℨij; Rose Water, q. s., fℨij, is reported to have been effective in stubborn eczema of the face and scalp. The crusts should first be removed by means of olive oil and asepsin soap. Its internal use should accompany its external application.

Internal. Profuse choleraic and excessive mucous discharges, as in cholera infantum and dysentery, are reputed to have been controlled by urtica, while it also has a restraining effect in gastric affections with excessive gastric secretion, and eructations, and vomiting. Chronic cystitis, with large mucous diuresis, is also asserted to have been benefited by it.

USTILAGO.

A parasitic fungus, *Ustilago segetum* Bull (Ustilago Maydis), developed on the fruit of *Zea Mays*, Linné, or Indian Corn (Nat. Ord. Fungi-Ustilagineæ). *Dose*, 1 to 20 grains.

Common Names: Corn Smut, Corn Ergot, Corn Brand.

Principal Constituents.—An alkaloid *ustilagine*, trimethylamine, and *sclerotic* (maizenic) *acid* (probably not identical with that of ergot).

Preparations.—*Specific Medicine Ustilago. Dose*, 1 to 60 drops.

Specific Indications.—Feeble spinal and sympathetic innervation; feeble capillary and venous circulation; impaired circulation of cerebrum, with dizziness and unsteadiness; uterine derangements with excessive flow of blood or other discharges; lax genital tissues, with uterine pain; pain in top of head; uterine inertia; post partum and passive hemorrhages.

Action.—This fungus unquestionably possesses power, acting as a spinal excitant and producing convulsions and destroying life either by tetanus or exhaustion. It dilates the pupils. Upon animals it acts as an abortifacient and produces a shedding of hair, hoofs and horns. Its action has been compared to that of ergot and nux vomica combined.

Therapy.—Ellingwood is authority for the statement that ustilago is preferable to ergot as a parturient because it produces intermittent (clonic) instead of tonic contractions; and decreases after-pains, conduces to better uterine involution, and controls hemorrhage. Neither, however, is scarcely used by practitioners of the present day for parturient purposes. Scudder advised it to relieve false pains during the latter months of pregnancy, and other unpleasant sensations in the pelvic regions. It is also claimed that it arrests a too prolonged lochial flow by giving tone to the uterine wall. Observing the specific indications noted above, it may sometimes give relief

to the disorders arising from masturbation and nocturnal pollutions, much as ergot and belladonna do, and in the ovarian and menstrual derangements, (chiefly of excessive discharges) in women with lax pendulous abdomen, weak and flabby enlarged uterus, and full toneless perineal and vaginal tissues. It is little used, but undoubtedly could be restudied with advantage.

UVA URSI.

The dried leaves of *Arctostaphylos Uva-ursi* (Linné), Sprengel (Nat. Ord. Ericaceæ). A perennial evergreen common in the northern part of Europe and North America. *Dose*, 30 to 60 grains.

Common Names: Uva Ursi, Bearberry, Upland Cranberry.

Principal Constituents.—A bitter glucoside *arbutin* ($C_{12}H_{16}O_7$), yielding *hydroquinone*, *methyl-hydroquinone*, and glucose; *ericolin* ($C_{16}H_{16}O$), *ursone*, tannic and gallic acids.

Preparation.—*Specific Medicine Uva Ursi. Dose*, 5 to 60 drops.

Specific Indications.—Relaxed urinary tract, with pain and bloody or mucous secretions; weight and dragging in the loins and perineum not due to prostatic enlargement; chronic irritation of the bladder, with pain, tenesmus, and catarrhal discharge.

Action and Therapy.—Uva Ursi is a true diuretic acting directly upon the renal epithelium. Owing to the presence of arbutin it is decidedly antiseptic and retards putrescent changes in the urine, and acts as a mild disinfectant of the urinary passages. It is to be used where the tissues are relaxed and toneless, with dragging and weighty feeling, and much mucoid or muco-bloody discharge. There is always a feeble circulation and lack of innervation when uva ursi is indicated. It is especially valuable in chronic irritation of the bladder, in vesical catarrh, strangury, and gonorrhœa with bloody urination. It is claimed that when cystic calculi are present uva ursi, by blunting sensibility, enables their presence to be more comfortably borne. Pyelitis and mild renal hæmaturia sometimes improve under the use of uva ursi. Arbutin, in its passage through the system, yields hydroquinone, and this body, further changed by oxidation, renders the urine dark or brownish-green. This should be explained to patients taking the drug in order to allay any unnecessary fears the phenomenon may excite.

VALERIANA.

The dried rhizome and roots of *Valeriana officinalis*, Linné (Nat. Ord. Valerianaceæ). A native of Europe, but cultivated in England and the United States. *Dose*, 30 grains.

Common Names: Valerian, Great Wild Valerian.

Principal Constituents.—A volatile oil (*Oleum Valerianæ*) composed chiefly of borneol and pinene, from 1 to 2 per cent, and *valeric acid.*

Preparations.—1. *Specific Medicine Valerian. Dose*, 1 to 30 drops.
2. *Tinctura Valerianæ*, Tincture of Valerian. *Dose*, 1 to 2 fluidrachms.
3. *Tinctura Valerianæ Ammoniata*, Ammoniated Tincture of Valerian. *Dose*, 1 to 60 drops.

Specific Indications.—Cerebral anemia; hysteria; chorea; hemicrania, all with mental depression and despondency; mild spasmodic movements.

Action and Therapy.—Valerian is a good cerebral and spinal stimulant. It also stimulates the gastro-intestinal secretions and favors digestion, unless given in too large doses or too long continued. It is one of the best of calmatives for that collective condition termed "nervousness". To act

well it should be given when the brain circulation is feeble and there is mental depression and despondency. With such symptoms it proves useful in hysteria and hypochondria, nervous headache, and hemicrania. It is one of the best medicines we possess in the treatment of chorea. It should be given with an equal quantity of specific medicine macrotys, about ten to fifteen drops of each, three or four times a day. It controls hyperæsthesia better than actual convulsive attacks; therefore, it is of little value in epilepsy, for which it has sometimes been suggested; and in chorea it should be persisted in when the movements are mild, in order to prevent more pronounced muscular incoördination. In mental depression, due to worry or imaginary wrongs, valerian is an admirable drug. Owing to its volatile oil it is a good carminative in flatulence, with nervous unrest, and relieves the disagreeable sense of fullness felt after a meal by causing a rifting of gas. The oil and the ammoniated tincture are useful agents in fainting and nervous palpitation of the heart.

VANILLA.

The fruit of *Vanilla planifolia*, Andrews (Nat. Ord. Orchidaceæ). A native Mexican vine, grown in many tropical countries, but on a commercial scale in Guadaloupe. *Dose*, 1 to 10 grains.

Common Name: Vanilla.

Principal Constituents.—The fragrance of vanilla is due to *vanillin* ($C_8H_8O_3$) and to the presence of a small quantity of balsam.

Preparation.—*Tinctura Vanillæ*, Tincture of Vanilla. *Dose*, 1 to 10 drops.

Derivative.—*Vanillinum*, Vanillin, is methylprotocatechuic aldehyde, occurring naturally in vanilla beans, or may be produced synthetically from several orthodihydroxy-benzene derivatives. It forms fine white or very pale yellowish, needle crystals having the characteristic taste and odor of vanilla; soluble in water and freely in alcohol, glycerin, ether and chloroform. It forms the whitish "frost" observed on vanilla. *Dose*, 1/4 to 1 grain.

Action and Therapy.—Vanilla is an aromatic stimulant, but is seldom used as a medicine. It is said to promote wakefulness, increase muscular energy, and to powerfully stimulate the sexual appetite. It is used chiefly as a flavoring agent for medicinal syrups and tinctures, confections, and pastry.

VERATRINA.

Veratrine, Veratria.

A mixture of alkaloids obtained from the seeds of *Asagræa officinalis* (Chamisso and Schlechtendal) Lindley; (Sabadilla seeds) (Nat. Ord. Liliaceæ). Tropical regions from Mexico to Venezuela.

Description.—A white or grayish-white, non-crystalline powder, without odor, but causing violent irritation and sneezing when even a minute quantity comes in contact with the nasal mucosa. *It should not be tasted.* Veratrine is slightly hygroscopic, though very sparingly dissolved by water (1,760 parts). It is very soluble in chloroform, alcohol and ether.

Action.—Locally, veratrine (or its salts) is a violent irritant closely resembling aconitine in action. Applied in alcoholic solution, ointment, or oleate, it excites a singular sense of heat and tingling, or prickling pain, which, however, does not last long, but is followed by coolness and more or less numbness; there is seldom redness or vesication unless the preparation is strong and applied with brisk friction. Inhaled, even in minute quantity, it occasions severe coryza and excessive sneezing. Muscular twitching has resulted from its application in ointment to the face, and

sometimes it gives rise to headache, nausea, griping, slight diarrhœa, and depression of the action of the heart. When swallowed it is a violent, irritant poison, causing great acrimony in the parts over which it passes, salivation, peculiar prickling numbness of tongue and mucous membranes, violent vomiting, profuse and sometimes bloody, and bilious diarrhœa (sometimes constipation); weak, irregular and quick pulse; cardiac depression; pallor of face and great faintness; cold sweats; muscular twitching and aching pain along the spine; contracted abdomen and pupils; and occasionally extreme pruritus and tingling which may persist for weeks. In so-called medicinal doses it produces a feeling of warmth in the stomach and bowels, which extends to the chest and extremities. In poisoning by it, the stomach should be thoroughly evacuated, and tannin solutions freely given and pumped out. Stimulation should be resorted to to overcome the depression; for this purpose alcoholics, aromatic spirit of ammonia, ammonium carbonate, artificial respiration, etc., may be employed.

Therapy.—*External.* Veratrine should be used only as an external application, and then rarely, in superficial functional neuralgia, myalgia, herpes zoster, chronic arthritis, acute gout, and other painful local inflammations. It is less effective than aconitine, but both are equally dangerous and great care should be exercised that it is not applied where the epiderm is denuded, nor should it be allowed to come into contact with or even be used near the eye, on account of the violent conjunctivitis caused by it. A 2 per cent solution in equal quantities of olive oil and oleic acid is usually employed.

Internal. Veratrine should not be used as an internal medicine.

VERATRUM.

The dried rhizome and roots of *Veratrum viride*, Aiton (Nat. Ord. Liliaceæ). An indigenous plant of swamps, low grounds, and moist meadows. *Dose*, 1 grain.

Common Names: American Hellebore, Swamp Hellebore, Green Hellebore, Indian Poke.

Principal Constituents.—A powerfully toxic alkaloid *veratrine* ($C_{32}H_{49}NO_9$), or *cevadine*, ocurring in both crystalline and amorphous forms; *protoveratrine* ($C_{32}H_{51}NO_{11}$), also extremely poisonous; *jervine*, *vertroidine*, *pseudojervine*, *rubijervine* (sternutatory) and resin.

Preparation.—*Specific Medicine Veratrum. Dose*, 1/20 to 5 drops.

Specific Indications.—Pulse full, frequent, and bounding; pulse full, rapid, corded or wiry; pulse full, strong, and intense, with throbbing of the carotids; pulse rapid and beating so forcibly that sleep is prevented; tissues full, not shrunken, and surface flushed with blood; increased arterial tension, with bloodshot eyes; erysipelas resembling an ordinary inflammation; cerebral hyperæmia; sthenic fevers and inflammations; irritation of nerve centers due to an excited circulation; convulsions, with great vascular excitement, full pulse, and cerebral hyperæmia; puerperal eclampsia; red stripe down center of the tongue; weight in the epigastrium, with forcible circulatory pulsations.

Action and Toxicology.—Veratrum is a powerful circulatory depressant. The exact action of the individual alkaloidal constituents is yet undetermined, as well as the effect each produces in the sum total of the effects of the root. According to Wood, the drug is a spinal and arterial depressant

having no direct action upon the spinal centers; the direct action of jervine upon the heart-muscle, and the stimulation of the inhibitory nerves by veratroidine lower the pulse-rate; the force of the heart-beat is lowered by the direct action of jervine upon the heart-muscle, while the same constituent, according to dose, produces a more or less complete vaso-motor paralysis. The depression of the spinal motor centers is attributed to jervine. The emetic action of veratrum is said to be due to the combined action of veratroidine and the resin. All vaso-motor depressants and all agents which diminish the vital force, favor the action of veratrum. Nausea is always the signal for suspension of the administration of the drug. Death from veratrum is caused by asphyxia.

Veratrine and cevadine are identical. The veratrine of commerce, however, is variable in composition, but its action is probably mostly due to the amount of true cevadine present. Late investigations show that most of the action of veratrine is that of cevadine, though veratrum does not furnish the veratrine of commerce (see *Veratrina*). One of the peculiar effects of veratrine is that of muscular contracture produced when in contact with the heart and the voluntary muscles. It is exhibited in a prolongation of relaxation following the contraction of the muscle, appearing almost like a tetanic effect, but it is free from any rigidity or spasmodic quality—in reality a prolonged contraction in which there is a long and gradual relaxation several times longer in duration than that occurring in the unpoisoned muscle.

American hellebore exerts an influence upon the system quite similar to that of White Hellebore (Veratrum album). Veratrine does not represent the action of this plant, which contains but a small proportion of this body. Applied to the skin, veratrum is rubefacient; and to the nose, excites sneezing. Small doses of veratrum appear at first not to affect the frequency of the pulse, but to lower its force; it afterwards slows the pulse, it becoming moderately full and soft, and remaining so, unless the patient, during this stage of depression, attempts to rise or make any exertion, when the pulse becomes very rapid, small, thready, and sometimes almost imperceptible. During the stage of depression there is marked muscular weakness and relaxation, and nausea and vomiting take place, the contents of the stomach being evacuated first, and then those of the gall-bladder. Occasionally a watery diarrhœa is caused by veratrum, sometimes amounting to hypercatharsis, but as a rule purging is not produced. The nausea produced by veratrum is intense, and the vomiting severe and often persistent, making it, therefore, an unsafe emetic. The most characteristic action of veratrum is its effects upon the movements of the heart and upon vascular tonus. The pulse-rate has been lowered to thirty-five beats a minute with this agent, a corresponding depression of force accompanying this action. When such depression is reached, it is seldom that emesis can be prevented. In large doses it is a very dangerous agent, yet, singularly, fatalities from its use are rare. Toxic doses produce an exceedingly weak heart-action, almost indistinguishable, running pulse, reduced temperature, cold, clammy sweat, extreme retching and incessant vomiting, dizziness, faintness, failure of sight, pupillary dilatation, complete muscular prostration, slow, shallow breathing, sleepiness, coma, and unconsciousness, with

sometimes stertorous breathing. The prompt emesis induced by this agent undoubtedly prevents lethal effects.

In poisoning by veratrum, withdrawal of the drug and free stimulation will quickly overcome the depression. Large draughts of warm water may be given to encourage and assist emesis until the stomach has been thoroughly washed out. This should be followed by undiluted whiskey or brandy to check the vomiting. Opium or morphine may be given by mouth or otherwise, ammonia and alcoholics may be used by enema or hypodermatically, and strychnine or digitalis may be given by the latter method. External heat, sinapisms, friction, etc., must be utilized, and under no circumstances must the patient be allowed to rise from the recumbent position, not even to raise the head to vomit.

Therapy.—*External.* Painted upon boils, felons, carbuncles, abscesses, inflamed acne, cellulitis, and other local inflammations, veratrum will frequently ease pain and facilitate resolution, or hasten suppuration. For erysipelas showing much tumefaction and redness, and appearing much like an ordinary inflammation, veratrum is one of the best topical applications. It should be given internally at the same time. Similarly used, it sometimes relieves herpes labialis and herpes zoster. It is one of the local medicines that occasionally relieves the dermatitis of rhus poisoning. Used by means of a spray it may abort acute tonsillitis and modify it after it is established. But small quantities should be used.

Internal. Veratrum is a remedy of great value and power, though quite transient in its effects. Small doses do good work when indicated, but they must follow each other at short intervals, so that a continuous action may be kept up. Owing to its tendency to induce gastric irritability, with nausea, large doses are not tolerated, and small doses are contraindicated when the tongue becomes long and pointed and reddened at the tip, and nausea and other unpleasant gastric phenomena are present. Veratrum increases secretion from the lungs, kidneys, and liver, but depresses the circulatory system. It is not adapted to asthenic troubles, but proves an admirable remedy in *sthenic conditions*, with the full, bounding pulse.

Therapeutically veratrum is one of the chief special or arterial sedatives. The so-called sedative action of this group of remedies, so important in specific medication, is in reality that of gentle stimulation of the nerves controlling the heart and circulation, and depends wholly upon the manner of using them. In the smallest medicinal doses they are arterial or special sedatives; in the large doses they are cardiac and circulatory depressants, and are then dangerous remedies. To this group belong the trinity—veratrum, aconite, and gelsemium. Each has its own special field, and no one of them will exactly duplicate the effects of the others. Aconite and veratrum have been said to act similarly. In a measure only is this true, and there are many properties peculiar to each. To do the kindly therapeutic work that veratrum accomplishes in small and safe doses would require a dangerous dose of aconite. Full doses of aconite will bring down the full, strong pulse in sthenic disorders, but it does so only in a dose which imperils the patient. So long as aconite is reserved for use in small doses for the small frequent pulse, without capillary resistance one need have no cause to fear its action in the least. But one must hesitate at the

large dose required to reduce a full, vigorous pulse, for there he is taking an unsafe risk; besides, we have in veratrum a drug that will meet the condition better and do it without the least danger to the patient's health or life. A long experience has convinced us fully of the confirmation of the truth that the great specific indication for veratrum is the *full, bounding pulse with or without inflammation or elevation of temperature.*

Veratrum is a remedy for *sthenic conditions*, whether it be a fever of any of the commoner types, an inflammation, iodiopathic or traumatic, or puerperal septicæmia, or puerperal convulsions. The prime indication is the full, bounding, rapid pulse, hard and rope-like in character, with or without fever or inflammation. It is the remedy where there is free action of the heart, with active capillary circulation; serous inflammation with hard and full pulse, or full and bounding pulse; or even with wiry or corded pulse. It should not be administered freely when there is gastric irritability, but fortunately, as a rule, when veratrum is indicated this irritability is not often present. The effects of veratrum are of short duration; therefore, it should be frequently administered in small doses for its continuous effects.

The winter season is particularly a time when veratrum is likely to be needed most. The majority of cases of acute infectious pneumonia, which prevail most largely during the cold months, come on suddenly with the full, bounding pulse. Veratrum wonderfully controls the circulatory and febrile conditions and aids in checking the inflammatory ravages of the disease. It should be given in the early stages only and in the cases markedly sthenic. The dose should be small and frequently repeated until the temperature and circulation respond, when the pain will be found to have been lessened, nervous excitation allayed, secretion reëstablished, and cough controlled. It is probably oftener indicated in acute pneumonia than any other agent except bryonia. In pleurisy, veratrum sometimes acts like magic, and in la grippe (epidemic influenza) it is, perhaps, the safest of all the circulatory sedatives and the most frequently indicated. At the onset of tonsillitis the conditions are usually sthenic and indications prominent for veratrum.

Painting veratrum upon the tonsils, or using it diluted by means of a spray, is often a great aid in controlling the inflammation, allaying pain and aborting abscess (quinsy). In all acute sthenic sore throats it is a most valuable agent. The facility with which veratrum controls the situation in acute respiratory disorders of a sthenic type, is a striking confirmation of the truth of specific medication—the pulse slows and softens, the temperature comes down without shock, expectoration is facilitated, pain is allayed, cough is lessened, and the nervous unrest gives way to peace and comfort, and in curable cases the battle is half won at the beginning. In chronic lung disorders we occasionally find veratrum of use when acute exacerbations occur and the circulation is augumented and temperature heightened. But as a remedy for other purposes, except occasionally to control nervous unrest, we have not found it so valuable in chronic pulmonary troubles as others have reported it to be. Veratrum should not be overlooked in hemoptysis, when there is great excitement of the circulation, the pulse being full and bounding. Here it justifies the claims made for it.

Veratrum is a most important agent in acute inflammatory disorders. Acute articular rheumatism of a sthenic type is well treated when veratrum forms a part of the medication, and if endocardial or myocardial inflammation accompanies or follows, we have never known it to do harm, but rather to be of benefit. In hypertrophy of the heart, accompanied or not with fever or inflammation, it is an ideal and safe agent. Erysipelas of the violent type, with full, bounding pulse and vivid redness, will find in veratrum one of the best medicines, using it both internally and locally. In peritoneal inflammation, due to blows upon the abdomen, veratrum is the best remedy known, and in septic peritonitis it assists greatly in controlling the circulatory excitement and inflammatory process, and contributes as much as any medicine can to a favorable termination of the disease. In any visceral inflammation, particularly pelvic, it is often indicated to control the blood current and modify the inflammatory action. Occasionally it proves valuable in gonorrhœa and to prevent or alleviate mastitis, orchitis, and ovaritis.

We have used veratrum with great satisfaction in individuals whose lives have been such as to task the circulation to its utmost, and who have before them the probability of a future chronic nephritis and arteriosclerosis. In these prenephritics, we will call them, a correction of vicious habits and the judicious use of small doses of veratrum will often avert disaster. If arteriosclerosis has not already obtained it may be warded off, the integrity of the kidneys maintained, and the life current guided past the point of danger. Small doses of specific medicine veratrum should be given for a prolonged period.

A remarkable instance of the therapeutic power of veratrum in high blood pressure was in that of a man bleeding from the gums. The patient, a blacksmith of middle age, indulged in occasional sprees and drank more or less all the time. The pulse was hard and full as a rope and whipping along vigorously and fast, nervous agitation was extreme, and blood was oozing from the spongy gums around every tooth in his head. The carotids were pulsating strongly, the eyes bulging and injected, and the head felt and looked as if it would burst. Veratrum, in the ordinary dose, completely relieved this man in less than two hours, with no return of the trouble—though the patient still continued his devotions at the shrine of Bacchus.

Veratrum may be employed in small doses for the relief of a certain form of nervousness. The patient has a full circulation, throbs, feels the beating of the heart, the abdominal aorta and the carotids. When retiring to rest, sleep is prevented by the throbbing pulsations in the head and ears, so distressing that sleep is prevented or delayed. Small doses of veratrum do wonders for these badly-shaken patients.

In the treatment of the common fevers, except the febricula, we have not found veratrum of much service; in fact, not often indicated. In our experience it has rarely been needed in typhoid fever, but occasionally is indicated in acute malarial intermittents. In the threatened attacks of sunstroke (not in heat exhaustion with pallor, cool skin, and weak pulse, but in the robust, full blooded, overheated individual, with bounding pulse and rope-like circulation), a few small doses of veratrum should be given at intervals of ten or fifteen minutes.

We are among those who believe that veratrum has some virtues outside of its power over the circulation, for it has alterative powers of great value. Just how it acts is not known; possibly its circulatory control aids also lymphatic elimination. While not prepared to go as far as did Howe in claiming it the only alterative in tubercular conditions, we believe it could be profitably restudied for its power of eliminating morbid products in many chronic ailments depending upon faulty elimination. Some have valued it in chronic bronchitis and so-called chronic pneumonia. As an alterative in chronic broncho-pulmonary disorders small doses of veratrum may be given for several days; and then omitted for a few days; or it may be administered every other day, syrup of lactophosphate of calcium being given on the days when the veratrum is omitted.

When convulsive disorders depend upon an excited circulation, veratrum may prove a useful anticonvulsive. It is sometimes of value in spinal irritation, with spasms, and in acute mania and cerebro-spinal meningitis, all with violent circulatory excitement. If accompanied by fever and there is hyperæmia, it may relieve neuralgic headache; otherwise it fails. When the pulse is full and bounding, the eyes bloodshot and suffused, and with a state bordering upon inflammation, it may restore quiet and allow sleep in delirium tremens.

Veratrum is our most important agent to control puerperal convulsions. We have injected a half drachm of specific medicine veratrum every half hour for three hours in a case of post-partum eclampsia, with puerperal mania, with the result of being complete master of the situation. In this disorder the full pulse must be subdued and kept subdued until the convulsions cease. It is the one instance in which the large or extreme physiologic (near toxic) dose of veratrum is absolutely demanded.

For the purposes above named, except where otherwise directed, veratrum should be given to control indications as revealed by the pulse, and then its administration should be stopped; and the fractional dose (15 to 20 drops in four ounces of water; dose, a teaspoonful every fifteen, thirty, or sixty minutes, as required) is much more satisfactory than large doses at long intervals. Veratrum will slow the pulse down to a very few beats. Usually, however, emesis will then take place. This is why veratrum seldom or never poisons. Only in exceptional cases are the large doses permissible, as in puerperal eclampsia, in which, singularly, it seldom occasions vomiting.

"Veratrum is less valuable than aconite in simple cardiac hypertrophy, though it quiets palpitation when blood pressure is high and the trouble is not due to valvular incompetency. It sometimes relieves the irritable heart of excessive tobacco users, especially when the heart action is strong and erratic. By retarding the velocity of the blood current and reducing vaso-motor tonus it does some good in aneurism. In all heart and circulatory disorders, especially in hypertrophy, it does good when the pulse is full, strong, and intense, the carotids beat forcibly, the eyes are bloodshot, and there is cough, headache, and weight in the upper epigastrium, while the heart may beat so violently as to shake the bed, and sleep is entirely prevented. It relieves the excitement, the heart-action approaches the normal, the cough is allayed, and the patient is in every way better." (Locke.)

VERATRUM ALBUM.

The rhizome and roots of *Veratrum album*, Linné (Nat. Ord. Liliaceæ). Europe, especially in the Alpine and Pyrenean districts.

Common Names: White Hellebore, White Veratrum.

Principal Constituents.—*Protoveratrine* ($C_{32}H_{51}NO_{11}$), intensely poisonous; *protoveratridine*, *jervine* (the most abundant principle), *pseudo-jervine*, and *rubijervine*. No cevadine (veratrine) is present.

Preparation.—*Homœopathic Mother Tincture of Veratrum Album. Dose*, fractional (see below).

Specific Indications.—Gushing, watery diarrhœa, with spasmodic or cramp-like action of the intestines and belly-walls; cold face, sunken eyes, and body covered with a cold sweat.

Action and Therapy.—Though closely resembling *Veratrum viride* in effects, this agent is used for entirely different purposes, based upon Homœopathic usage. These are choleraic diarrhœa, cholera morbus, cholera infantum, and Asiatic cholera, to control the gushing discharges and check vomiting. The Homœopathic mother tincture in 3x dilution in the proportion of thirty drops in four ounces of water is the usual form of administration, the dose being a teaspoonful of this mixture every fifteen to thirty minutes. It is not often used in this country.

VERBASCUM.

The leaves and tops of *Verbascum Thapsus*, Linné (Nat. Ord. Scrophulariaceæ). A biennial common in the United States. *Dose*, 5 to 30 grains.

Common Name: Mullein.

Principal Constituents.—A volatile oil, a bitter principle, mucilage and resins.

Preparation.—*Specific Medicine Verbascum. Dose*, 5 to 30 drops.

Specific Indications.—Nervous and bronchial irritation, with cough; and urinary irritation with painful micturition.

Action and Therapy.—Mullein is demulcent, diuretic and sedative. It is also thought to have feeble anodyne properties. A syrup of mullein, prepared with the addition of lemon juice, is a fairly good sedative for irritation of the trachea and bronchi with persistent cough. It is applicable to dry, hoarse coughs which annoy the patient when lying down, as well as to cough associated with abundant catarrhal discharges. The specific medicine may be used for the same purposes. A so-called oil of mullein, or rather mulleinized oil, prepared by steeping the blossoms in oil in the sun, has a fabulous reputation of being curative in earache from otitis media. A truer preparation is prepared by exposing the blossoms alone in a bottle to the heat of the sun. Owing to the small yield and the consequent high price it is seldom used, and probably is no more efficient than mulleinized oil, a concoction of very doubtful utility.

VERBENA

The whole plant of *Verbena hastata*, Linné (Nat. Ord. Verbenaceæ). A common wayside and field weed in the United States.

Common Names: Vervain, Common Vervain, Wild Hyssop, Simpler's Joy.

Principal Constituents.—No satisfactory analysis has been made.

Preparation.—*Fluidextractum Verbenæ*, Fluidextract of Verbena. *Dose*, 10 to 60 drops.

Action and Therapy.—This drug is said to relieve gastro-intestinal

irritation and stimulate menstruation. In recent years it has been lauded as a remedy for epilepsy characterized by cerebral anemia, instead of congestion, and therefore applicable to conditions contraindicating bromide medication. Its value remains to be established.

VIBURNUM OPULUS.

The bark of *Viburnum Opulus*, Linné (Nat. Ord. Caprifoliaceæ). A shrub of Northern United States and Canada.

Common Names: Cramp Bark, High Cranberry.

Principal Constituents.—A bitter, neutral principle, *viburnin*, and *valeric acid*.

Preparation.—*Specific Medicine Viburnum. Dose*, 5 to 60 drops.

Specific Indications.—Cramps; spasmodic uterine pain; pain in thighs and back; bearing-down, expulsive pain; neuralgic or spasmodic dysmenorrhœa.

Action and Therapy.—Like black haw, this species of Viburnum is a uterine sedative and tonic and may be used where there is a predisposition to abortion, or as a partus præparator. It is believed to have stronger antispasmodic properties than the black haw, and the special indication is cramps or cramp-like contraction of the hollow viscera, as well as of the voluntary musculature. It allays uterine irritation with a tendency to excite hysteria, and for spasmodic dysmenorrhœa it is highly regarded by competent practitioners. Briefly, the therapeutic scope of the drug covers cramps, especially of the calf of the leg, spasmodic uterine pain, bearing-down or expulsive pain, difficult, spasmodic or neuralgic dysmenorrhœa, spasmodic contraction of the bladder, hysteria, and some mild forms of convulsions.

VIBURNUM PRUNIFOLIUM.

The dried bark of the root of *Viburnum prunifolium*, Linné. The U. S.P. admits the dried bark of this and also of the *Viburnum Lentago*, Linné, or Wayfarer's Tree (Nat. Ord. Caprifoliaceæ). Beautiful shrubs found in thickets of the eastern half of the United States. *Dose*, 5 to 60 grains.

Common Names: (1) Black Haw, Sloe, Sloe-leaved Viburnum, Stag Bush; (2) Wayfarer's Tree, Nanny Berry, Sheep Berry.

Principal Constituents.—A brown, bitter resin; greenish-yellow, bitter, *viburnin*, *valeric acid*, tannic acid, citrates, malates, oxalates, sulphates, and chlorides of calcium, magnesium potassium, and iron.

Preparations.—1. *Specific Medicine Black Haw. Dose*, 5 to 60 drops.
2. *Black Haw Cordial* (Howe's). (Contains Black Haw, Wild Cherry, Aromatics, Brandy and Syrup). *Dose*, 1/2 to 2 fluidrachms.

Specific Indications.—Uterine irritability and hyperæsthesia; uterine colic; threatened abortion; dysmenorrhœa, with cramp-like pelvic pain, and scanty flow; severe lumbar and bearing-down pelvic pain; painful contraction of the pelvic tissues; false pains and after-pains; obstinate hiccough.

Action and Therapy.—Black haw is a remedy of Eclectic development and is praised by practitioners of all schools of medicine for its virtues in disorders of women. It is both tonic and antispasmodic, well-sustaining the time-honored meaning of those terms. While a tonic to the gastro-intestinal tract and a good one, black haw is better adapted to atonic states of the female reproductive organs, and as a sedative for spasmodic pain and weakness in diseases of women. As a tonic it acts kindly and is pleasant to

take. It causes no constitutional symptoms, such as sometimes come from the use of cinchona, nux vomica, and the more energetic tonics. It is agreeable to the stomach and tends to restrain unhealthy discharges. It allays the nervous unrest so commonly associated with pelvic weakness; and its effect upon cramp-like contraction of both the tubular organs and the voluntary musculature of the body is similar to that of cramp bark or Viburnum Opulus.

As a uterine sedative and tonic, black haw is used, perhaps, oftener than any other drug. It seems to improve the uterine and ovarian circulation, giving better innervation and more perfect functioning, and evidently promotes pelvic nutrition. In relaxation of pelvic tissues, with more or less congestion, or tendency to undue discharges and passive hemorrhage, it is one of the best of medicines. For painful menstruation, whether due to debility with relaxation, or to engorged tissues with cramp-like pain, the physician will find almost daily use for black haw. Sometimes the menstrual flow is scanty, but more often it is profuse and accompanied by severe bearing down, intermittent and expulsive pains. Few agents give greater relief in such conditions. In cases in which the menses are imperfect in function and pale in quality, and there is an associated cardiac disturbance, usually palpitation; and in some cases of amenorrhœa, in anemic girls with pallor and subject to intermittent cramping pain, the action of the drug is very positive. It is equally valuable in chronic uterine inflammation, in subinvolution, in boggy, congested uterus, and for the associated leucorrheal discharges. As a remedy for passive hemorrhage its use will be governed largely by the cause. If due to polypi, fibroid or carcinomatous tumors, but little can be expected from it or any other medicine. But even here, in combination with cinnamon, it sometimes restrains the flow. Such cases are surgical and should be surgically treated. Many a good medicine, like black haw, has been brought into discredit because of its failure to do what a careless or faulty diagnosis has led one to hope for from its exhibition or to attempting physical impossibilities with such medication. Black haw is a good tonic during pregnancy, and through such action proves a fairly good partus præparator. It is one of the most certain remedies for nocturnal cramping of the muscles of the leg. It does not act so well when due to pregnancy, as that is a pressure condition that can only be relieved by supporting the abdomen or a change of position in reclining.

Many practitioners, whose opinions we value and whose experience has been wide, report success with black haw in restraining the expulsion of the product of conception. Our own experience leads us to doubt its reputed value in that condition, but this in no way disparages the statements of others who may have been more successful with it. Rest in bed and quieting agents, such as Dover's powder, may enable the product to be retained; perhaps black haw may aid. But we have utterly failed in every attempt to prevent miscarriage with the agent where there was any considerable hemorrhage or where enforced and prolonged rest was not insisted upon. If any results are to be expected from it in habitual abortion it must be in cases of functional debility of the reproductive organs, and not in those due to inherited taints or syphilitic infections, or criminal operative interference. We believe, however, that much may be done with

black haw to strengthen conditions in cases having had a previous miscarriage, and in uneasy, cramp-like sensations occurring during pregnancy, but with no considerable hemorrhage. It will, however, be of service in controlling the nervous phenomena associated with such threatened accidents and aid psychologically in preventing that which undue nervous agitation might precipitate. It is a good agent for false pains and for ovarian irritation and congestion. Black haw cordial is an ideal sedative for spasmodic dysmenorrhœa.

Black haw is of very great value in treating those having a craving for alcoholic drinks. The specific medicine black haw, with essence of cinnamon or of cloves, or preferably Howe's Black Haw Cordial may be given. It relieves the discomfort experienced in the throat and the gnawing distress in the stomach, from which these unfortunates suffer.

For most purposes the specific medicine black haw is given in doses ranging from five to sixty drops, two, three, or four times a day as indicated; the black haw cordial in doses of one half to two fluidrachms.

VISCUM.

The leaves and branches of *Viscum flavescens*, Pursh (Nat. Ord. Loranthaceæ). A parasitic plant found upon forest trees, especially the oaks in America.

Common Names: Mistletoe, American Mistletoe.

Principal Constituent.—*Viscin*, a viscous substance also known as *bird glue* or *bird lime*.

Preparation.—*Specific Medicine Mistletoe. Dose*, 1 to 30 drops.

Specific Indications.—Determination of blood to the brain, flushed face and oft-recurring headache; paroxysms of tearing, rending neuralgic or rheumatic pains; weak, irregular heart-action, with cardiac hypertrophy, valvular insufficiency and shortness of breath.

Action and Therapy.—Viscum has toxic properties. Vomiting and bloody and tenesmic catharsis, prostration, contraction of the pupils, muscular spasm, convulsions and coma have been reported from eating the plant and berries. Its action would suggest its possible value in nervous disorders, and it has been used like strychnine in heart disorders with feeble pulse, dyspnœa, œdema, and inability to lie down. It is also asserted to possess parturient properties, but they do not compare with those of ergot, and the drug is almost never used for these purposes. It should be reserved for the conditions mentioned under "Specific Indications", and even in these it needs further study.

XANTHIUM.

The whole plant of *Xanthium spinosum*, Linné (Nat. Ord. Compositæ). An introduced weed common along the coasts of the United States. *Dose*, 5 to 30 grains.

Common Name: Spiny Clot-Bur.

Principal Constituents.—Possibly an evanescent alkaloid and considerable nitrate of potassium.

Preparation.—*Specific Medicine Xanthium Spinosum. Dose*, 1 to 60 drops.

Specific Indications.—Ague, with profuse sweating; prophylactic against malaria, and to prevent the recurrence of chills; nervous excitation, with profuse sweating; bloody urine, with urination painfully tenesmic and frequent; urine heavily loaded with mucus and gravelly deposits.

Action and Therapy.—Clotbur is used chiefly as a soothing diuretic, to allay irritable conditions of the bladder, and is especially recommended in chronic cystitis and hæmaturia. It is frequently used in conjunction with tincture of red onion, for irritation of the urinary tract with bloody, painfully voided urine loaded with mucus and gritty deposits. Its other uses cover the indications given above, unnatural sweating being an especial indication for the drug.

XANTHIUM STRUMARIUM.

The whole plant of *Xanthium strumarium* Linné (Nat. Ord. Compositæ). Waysides in the United States.

Common Name: Broad Bur-Weed.

Preparation.—*Fluidextractrum Xanthii Strumarii*, Fluidextract of Xanthium Strumarium. *Dose*, 5 to 60 drops.

Action and Therapy.—This agent acts much like clotbur, and has been used with advantage in painful urination, with scalding, and marked sensitiveness of the urethra and bladder, with frequent micturition. It is also said to be of service in hemorrhages, as passive hemorrhage from the bowels and the epistaxis of purpura hemorrhagica. For the last-named disorders it is probably of little value, though it should be tried where other means are unavailing.

XANTHOXYLUM.

The bark and berries of (1) *Xanthoxylum americanum*, Miller, and (2) *Xanthoxylum Clava-Herculis*, Lamarck (Nat. Ord. Rutaceæ). Shrubs of North America. *Dose*, 5 to 60 grains.

Common Names: Prickly Ash; (1) Northern Prickly Ash; (2) Southern Prickly Ash.

Principal Constituents.—A green acrid oil, a white crystallizable resin, a soft acrid resin, tannin, and a bitter substance thought to be an alkaloid.

Preparation.—*Specific Medicine Xanthoxylum. Dose*, 5 to 60 drops.

Specific Indications.—Hypersecretion from debility and relaxation of the mucosa (small doses); atony of the nervous system (larger doses); capillary engorgement in the eruptive diseases; sluggish circulation; tympanites in bowel disorders; intestinal and gastric torpor, with deficient secretion; dryness of mouth and fauces, with glazed surface; flatulent colic; Asiatic cholera; uterine cramps and neuralgia.

Action.—Prickly ash impresses the secretions and the nervous and circulatory systems. The bark, when chewed, imparts a sweetish aromatic taste, followed by bitterness and persistent acridity; the berries act similarly. The drug has remarkable sialagogue properties, inducing a copious flow of saliva and mucus. Swallowed, it warms the stomach and augments the secretion of the gastric and intestinal juices, and probably increases hepatic and pancreatic activity. The action of the heart is strengthened by xanthoxylum, the pulse slightly quickened, and the glands of the skin are stimulated to greater activity. The urine is decidedly increased by prickly ash.

Therapy.—Preparations of prickly ash bark are to be preferred when stimulant, tonic, sialagogue, and alterative properties are desired; that of the berries when a carminative stimulant and antispasmodic is needed, especially in disorders of the stomach and bowels.

Xanthoxylum is particularly grateful in stomach disorders. It is an ideal gastric stimulant, and as a remedy for simple gastric atony it ranks

well with capsicum. When food ferments readily and gaseous accumulations distend the stomach, and there is much belching, from five to fifteen drops of specific medicine xanthoxylum may be given, preferably in hot water, one hour before and one hour after meals. Both hydrastis and capsicum, or each of them, may be given with it, if indications are clear for them, and together the three agents offer comfort to those who suffer the distress of so-called flatulent dyspepsia. It is a remedy of much worth in atonic dyspepsia and in gastric catarrh, when there is enfeeblement and relaxation of tissues and hypersecretion. It is also of value in constipation when due to deficient secretion (small doses). Formerly it was greatly valued in spasmodic conditions of the bowels with colic, and in cholera morbus in weak individuals, and to restore tone and normal secretion after attacks of epidemic dysentery, a disease once more prevalent than at the present time. King introduced the tincture of the berries as a remedy for Asiatic cholera, in which it proved phenomenally successful; and for tympanitic distention of the bowels arising during peritonitis. As a rule, however, it should not be given in inflammatory conditions.

As a stimulant to sluggish membranes prickly ash may be given internally (and used locally) in dry, glazed pharyngitis with crusts of adherent, dried mucus. Of its alterative power there is no question, and prickly ash is an ingredient of a popular compound known as "Trifolium Compound", which has been extensively used in chronic syphilitic dyscrasia. It is not to be assumed that it has antisyphilitic virtues, but it exerts a favorable alterative action which renders syphilitics more amenable to reparation of tissues. Sometimes a tincture of prickly ash berries is the best drug that can be given in so-called chronic muscular rheumatism; and it is not without value in lumbago and myalgia. Chewing prickly ash bark is a domestic custom for the relief of toothache.

Xanthoxlum should also be remembered where nerve force is low and in the recuperative stage from attacks of neuritis or other forms of nerve involvement in which function is greatly impaired but is yet capable of restoration. Xanthoxylum deserves further study, chiefly as an alterative.

ZEA.

The styles and stigmas of *Zea Mays*, Linné (Nat. Ord. Gramineæ). The common Indian corn of America.

Common Name: Corn Silk (Stigmata Maydis).

Principal Constituents.—Volatile oil and *maizenic acid.*

Preparations.—1. *Infusum Zeæ*, Infusion of Corn Silk. (Silk, ℥ij; Boiling Water, Oj). *Dose, Ad libitum.*

2. *Specific Medicine Stigmata Maydis. Dose,* 1/2 to 2 fluidrachms.

Action and Therapy.—Zea (*Stigmata Maydis*) is diuretic, slightly anodyne, and is said to exert a stimulant effect upon the heart and blood vessels. The infusion, the best preparation, is an efficient stimulating diuretic in urinary irritation and inflammation, pyelitis, and catarrh of the bladder. It is especially valued when the urine contains phosphatic and uric acid concretions, and there is a disposition to dropsical accumulations. Its action is quite positive in pyelitis, chronic cystitis and to relieve ardor urinæ in gonorrhœa. For the bladder affections of children it is one of the most valued of urinary sedatives, and may be freely administered where

there is a disposition to decomposition of the urine while still in the bladder. The virtues are attributed mostly to the maizenic acid present.

ZINCI CARBONAS PRÆCIPITATUS.

Precipitated Zinc Carbonate.

Description.—An odorless and tasteless, white, impalpable powder; insoluble in water or alcohol. It is of a variable chemical composition.

Action and Therapy.—Precipitated zinc carbonate, as well as a more impure form (prepared calamine) is feebly astringent and is employed chiefly as a dusting powder for infants and as a mild dessicant in chafing, intertrigo, simple ulcers, excoriated nipples, and abrasions.

ZINCI CHLORIDUM.

Zinc Chloride. (Formula: $ZnCl_2$.)

Description.—A very deliquescent white or whitish granular powder, or irregular porcelain-like masses, or molded pencils, without odor, and so intensely caustic as to make tasting dangerous, unless the salt be dissolved in a considerable quantity of water, when it has a metallic astringent taste.

Preparation.—*Liquor Zinci Chloridi*, Solution of Zinc Chloride. An aqueous solution containing about 50 per cent of zinc chloride.

Action and Toxicology.—In large doses chloride of zinc is a violent irritant poison, producing burning in the stomach, nausea, vomiting, dyspnœa, anxiety, small quick pulse, cold sweats, fainting, and convulsions. Applied undiluted to the tissues it unites with the proteins, forming difficultly soluble compounds; and acts as a prompt corrosive, penetrating deeply but limited in action to the parts to which it is applied. It is strongly antiseptic, and solutions of the salt are astringent and feebly hæmostatic. In poisoning by zinc salts the stomach should be washed out and lenitives administered, such as demulcent drinks of starch and albumen in the form of milk or eggs. Lime water may also be used.

Therapy.—*External.* Zinc chloride is the most commonly employed escharotic for the destruction of malignant growths. It is usually mixed with other agents to form a paste, and may be employed for the removal of epithelioma and carcinoma that cannot be removed by the knife, or when the patient will not submit to surgical measures. To be effectually destructive it must be crowded into the growths until every part is reached, and it prevents hemorrhage by its mummifying action upon the tissues. The procedure is extremely painful, but is said to be less so than that with arsenic pastes. It is a safe escharotic as its action does not extend beyond the area of application. It penetrates deeply, and after a couple of weeks the tough and hard eschar separates, leaving a granulating surface which ordinarily heals rapidly. This, however, does not always cure the disease. Rarely zinc chloride is applied to gangrenous ulcers, and to chancre and chancroids, and very weak injections have been used in obstinate gonorrhœa and gleet. The sulphate is more manageable, however, for injection purposes.

Escatol (a combination of zinc chloride, salicylic acid and petrolatum in varying strengths) was devised and used by Howe for the destruction of warts, moles, scaly lupoid ulcers, chronic eczema, ringworm, sluggish leg ulcers, nasal polypus, fistulous tracts, fissure of the anus, wounds, in cancerous growths, and in syphilitic ulcers of the mouth and throat.

Internal. Zinc chloride is not used as an internal medicine in Eclectic practice.

ZINCI OXIDUM.

Zinc Oxide. (Formula: ZnO.)

Description.—A very fine, non-gritty, amorphous, white or yellowish-white powder; odorless and tasteless; insoluble in water or alcohol. It gradually absorbs carbon dioxide if exposed to the air. *Dose*, 1 to 10 grains.

Preparation.— *Unguentum Zinci Oxidi*, Ointment of Zinc Oxide. (Zinc Salve) 20 per cent zinc oxide.

Action and Therapy.—*External.* Zinc Oxide is a favorite dusting and dessicant powder, and in the form of the ointment is probably the most widely used protective and mild astringent in many skin affections. It is especially applicable to excoriations, simple ulcers, ulcers caused by burns and scalds, moist skin eruptions, chronic eczema, chapped surfaces, cracked nipples, fissures behind the ears, impetigo, and occasionally in tarsal ophthalmia.

Internal. Rarely, zinc oxide is used in nervous dyspepsia when the tongue is broad and the abdomen full, in gastric ulcer, in chronic gastritis, with excessive secretion of mucus, and in colliquative night sweats. Continued small doses produce gastro-intestinal and nervous derangements, and blood changes, while large quantities occasion diarrhœa, œdema and marasmus.

ZINCI PHENOLSULPHONAS.

Zinc Phenolsulphonate, Zinc Sulphocarbolate. (Formula: $(C_6H_5O.SO_3)_2Zn+8H_2O.$)

Description.—Transparent, colorless crystals or a granular powder, without odor but having a metallic astringent taste. Upon exposure it effloresces and may turn pink; soluble readily in water and alcohol. *Dose*, 1 to 3 grains.

Specific Indications.—"Tongue pallid, moist, pasty and dirty" (Thomas); intestinal sepsis, with free, foul-smelling passages; tympanites; septic fever and hemorrhage in typhoid fever, and other septic bowel disorders.

Action and Therapy.—*External.* Zinc sulphocarbolate is astringent and antiseptic. It is said to be superior to sulphate of zinc in injections for gonorrhœa. A 1 to 5 per cent solution is advised.

Internal. The chief use for this drug is that of an intestinal antiseptic and for the septic fevers arising from a foul condition of the intestinal tube. It checks fermentation, restrains hemorrhage, lowers temperature, and prevents and reduces tympanites. The best indication for it is that named by Thomas—"tongue pallid, moist, pasty and dirty". It may be used with benefit in typhoid fever, cholera infantum, septic diarrhœa, dysentery and the diarrhœa of phthisis. A trituration of equal parts of the salt and milk sugar, given in two to five grain doses, every two to four hours, is the best form for administering it.

ZINCI PHOSPHIDUM.

Zinc Phosphide. (Formula: Zn_3P_2).

Description.—A gritty, dark-gray powder, or crystalline fragments of a dark metallic luster, having a faint odor and taste of phosphorus. In contact with the air it slowly evolves a phosphorous vapor. It should, therefore, be kept in close containers. Neither water nor alcohol dissolves it. *Dose*, 1/100 to 1/10 grain.

Specific Indications.—Cerebral anemia; brain fag, with pallid counte-

nance, insomnia, and depression; pain in any portion of the spinal cord; cerebral softening.

Action and Therapy.—Following the indications given this drug may be used in conditions of debility with impaired nutrition of the brain and cord. It has been especially used in spinal irritation, cerebral exhaustion from brain-fag or anemia, in cerebral degeneration, in aphasia, locomotor ataxia, and paralysis agitans. As these conditions are not readily amenable to medication, too much must not be expected of this or any other drug. While some of these conditions have been improved by zinc phosphide, it has also utterly failed in most instances. A good method of administration is that of the 2x or 3x trituration in doses of one grain, four times a day.

ZINCI SULPHAS.

Zinc Sulphate. (Formula: $ZnSO_4.7H_2O$.)

Description.—Transparent, colorless crystals, or a crystalline, granular powder, odorless but having an astringent metallic taste. It is very soluble in water and soluble in glycerin; insoluble in alcohol. Zinc sulphate closely resembles magnesium sulphate in appearance. *Dose*, 1 to 30 grains.

Action.—In large doses zinc sulphate is an irritant poison causing vomiting, cold extremities, fluttering pulse, and marked depression. It seldom causes death. In doses of ten to fifteen grains it is a rapidly acting emetic, and produces vomiting before nausea can take place. Moreover, it is but slightly depressant.

Therapy.—*External.* In weak solution, one to six or eight grains to the fluidounce of water, sulphate of zinc forms a good collyrium for chronic ophthalmias, with loose tissues and flabby granulations. Though ordinarily not commended for acute conjunctivitis, we have found a very dilute wash, one-half to one grain to the ounce, very effectual in acute catarrhal conjunctivitis and promptly curative in ophthalmia neonatorum. Zinc sulphate in very dilute solution forms a good injection for gonorrhœa, and together with Lloyd's Colorless Hydrastis is one of the best of gonorrhœa injections. ℞ Colorless Hydrastis, fℨj; Zinc Sulphate, gr. ij; Water, q. s., fℨij. Mix. Sig.: Inject and retain for a few minutes, after previous washing out of the urethra with plain warm water. A solution may be used wherever an antiseptic astringent is needed and where tissues are lax and hypersecretion is abundant, as in leucorrhœa.

Internal. Zinc sulphate is one of the best of emetics for narcotic poisoning, if given early before the nervous centers and terminal filaments have become obtunded. It is prompt, seldom nauseates, and causes little or no depression. It is also serviceable as an emetic when foreign bodies have lodged in the trachea. As a rule, it should not be used in poisoning by irritants. Sulphate of zinc was once employed for a number of nervous and gastro-intestinal disorders, for which it has long been discarded.

ZINCI VALERAS.

Zinc Valerate, Zinc Valerianate. (Formula: $Zn(C_5H_9O_2)_2+2H_2O$.)

Description.—Pearly white scales or a white powder; to the taste sweetish, astringent and metallic. It has the odor of valeric acid. Soluble in alcohol and partly soluble in water. *Dose*, 1 to 3 grains.

Action and Therapy.—Owing to its vile odor, zinc valerate is not a popular salt. It has been used with varying degrees of success in paroxysmal neuralgia, as an antispasmodic, and to relieve pain. It is especially mentioned for the relief of nervous headache, facial and sciatic neuralgia, and neuralgia of the spine. Watkins advised three to five grains of the 3x trituration in "colic, reflex from ovarian or uterine disease; headache; paleness; dizziness; sleeplessness; and anemia."

ZINGIBER.

The dried rhizome of *Zingiber officinale*, Roscoe (Nat. Ord. Zingiberaceæ). Southern Asia; cultivated in tropical regions of Asia, Africa and America. *Dose*, 10 to 30 grains.

Common Names: Ginger. (There are many kinds and grades: Jamaica Ginger, African Ginger, Calcutta Ginger, Calicut Ginger, Cochin Ginger, and Japanese Ginger.)

Principal Constituents.—An aromatic volatile oil (Oil of Ginger), 2 to 3 per cent giving to ginger its flavor; resin, and *gingerol*, the pungent principle.

Preparations.—1. *Specific Medicine Zingiber. Dose*, 1 to 30 drops.
2. *Oleoresina Zingiberis*, Oleoresin of Ginger. *Dose*, 1/2 to 1 grain.
3. *Tinctura Zingiberis*, Tincture of Ginger. 5 to 60 minims.
4. *Syrupus Zingiberis*, Syrup of Ginger. *Dose*, 1 to 4 fluidrachms.

Specific Indications.—Anorexia; flatulence; borborygmus; gastric and intestinal spasms; acute colds; painful menstruation; cold extremities; cool surface in children's diseases.

Action.—Ginger is a local irritant and rubefacient. It causes an increased flow of saliva and gastric juice and increases muscular activity of the stomach and intestines. It is much used to conceal the taste of nauseous medicines and to prevent tormina. Ginger is sometimes used as an ingredient of so-called "spice poultices".

Therapy.—Ginger is an admirable local stimulant, sialagogue, diaphoretic and carminative. Powdered ginger in a large quantity of cold water, taken upon retiring, will frequently "break up" a severe cold, and a hot infusion or ginger tea is a popular remedy for similar use and to establish sluggish menstruation or mitigate the pains of dysmenorrhœa. Ginger is an excellent agent in gastric atony, and good results may be had from it in atonic states of the digestive tube, with loss of appetite, rolling of gases in the bowels, and painful spasmodic contractions of the stomach and intestines. In acute dysentery and diarrhœa, and in cholera morbus and sometimes in cholera infantum with atony and nausea, vomiting and cold extremities and surface, small doses of ginger preparations are extremely valuable. Cramps in the stomach and bowels due to undigested food or to cold are speedily relieved by small doses of ginger. Ginger combined with magnesium oxide or sodium bicarbonate is a good gastric stimulant and corrective in persistent flatulency with sour stomach, and given alone is useful for old people with feeble digestive powers and enfeebled and lax habit.

Rarely, tincture of ginger or specific medicine zingiber is serviceable in fevers, when the salivary secretions are scanty and there is pain and movement of gases in the intestines. It relieves by stimulating secretion, the ultimate effect being sedative. In such states it acts much like capsicum, but is not so efficient. Oleoresin of ginger may be added to pills to prevent griping and tormina; and the syrup is an agreeable vehicle for stomachic and sometimes for expectorant mixtures.

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